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Plan Timor Leste EWB Challenge

Project Design Brief

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1 January 2013

Dear EWB Challenge Students,

Welcome to the Challenge and the Engineers Without Borders (EWB) family! It's great to have so many of you on board for the year with the opportunity to learn more about and contribute towards our work with Plan Timor Leste (Plan-TL).

EWB and Plan-TL have been in partnership implementing water and sanitation hygiene (WASH) programs within Timor Leste successfully for many years. Individually, Plan-TL have been working with local NGO's in the communities of Timor Leste since 2001, helping poor children and youth to access their rights to education, health, livelihoods and protection. Plan-TL's vision is of a world in which all children realise their full potential in societies that respect people's rights and dignity and it does this through implementing programs aimed to improve early childhood education, water, sanitation and hygiene services, child protection, youth livelihoods and youth participation.

The EWB Challenge is a fantastic opportunity for you to learn about and understand a wonderfully rich culture and be involved in an exciting time of change for rural communities in the Lautem District, Timor Leste. It is an opportunity to learn not just about the challenges facing their communities, but also about community development in general, and the role engineers and other technical professionals can play.

Access to things we take for granted like water, sanitation, energy, education and health care is extremely difficult for many of the world's poor. As engineers and global citizens, we can facilitate access to these basic human rights with the will to make a difference and an appropriate approach.

I am really looking forward to sharing your ideas with Plan Timor Leste, and also sharing your journey as students and engineers with our Community Partners in Timor Leste.

Yours Sincerely,

Jenny Turner
EWB Challenge Coordinator
Engineers Without Borders Australia

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INTRODUCTION TO THE PLAN TIMOR LESTE EWB CHALLENGE

Plan Timor Leste (Plan TL) is a non-government organisation operating as part of Plan International. Plan International is one of the oldest and largest children's development organisations in the world and structures itself around the needs of children promoting their rights and lifting them out of poverty.

In 2012 Plan TL and Engineers Without Borders Australia collaborated extensively to identify a range of areas for growth within the district of Lautém that will have broader implications for not only the children, but the community as a whole. Students are invited to develop innovative and appropriate project solutions for those areas and as such make a real contribution towards the sustainable development of communities in the district of Lautem, Timor Leste. To assist student in understanding the context the small rural village of Codo, within the Lautem district, was chosen for the EWB Challenge and is representative of the communities in the region. Plan TL hopes to use the ideas from the students design projects will be able to be integrated into programs in other communities in the district as well.

Student projects for this year have been separated into seven overarching design areas including; infrastructure and construction, water supply and sanitation systems, energy, waste management, transportation, information communications technology and climate change.

You are invited to choose between addressing a single design area or integrating multiple areas into a single design solution. Alternate projects may also be considered. The EWB Challenge is created in an open-ended structure that facilitates individual universities and design teams to choose their own breadth and depth of design within the context of submission requirements.

The following information has been provided to assist in the development of concept designs for projects within the growth areas. These designs, coupled with knowledge and skills sharing, aim to support Plan Timor Leste to address the social, environment, economic and technical issues facing the people of the Lautem district.

Additional in-depth information and data on the district and each of the design areas can be found on the EWB Challenge Website at: www.ewb.org.au/ewbchallenge

DESIGN AREA 1 - INFRASTRUCTURE & CONSTRUCTION

Typical house in Codo, Timor Leste (2012)

PROJECT STATEMENT

Villages (*aldeas*) within the Lautém district have a high household ownership rate (92.3%) and a further 6.5% live for free with extended family. Building materials are a widely used proxy for relative economic standing and tend to correlate well with household financial capacity. Traditionally houses are either made from stones/rocks or bamboo with a predominantly earthen floor. Cement and metals are purchased from shops in Dili which adds transport costs but are the more preferred 'permanent' materials. Bamboo and more traditional materials can be sourced from the community. There are a lot of abandoned homes and buildings left behind from the Indonesian occupation that could be rehabilitated however uncertainties surrounding landownership makes this difficult.

There is very little money within communities to hire professional tradespeople and so volunteers from the community use their own ingenuity and labour for all construction projects ranging from houses, community buildings, furniture, and water and sanitation (WASH) projects including drainage, pipelines, toilets, irrigation and pumps. Most of the participants in these projects have had no formal training however there is a strong desire to learn new skills and improve on the current construction techniques.

The development of child friendly spaces (CFS) is also a large part of Plan-TL's work in partnership with other local NGO's such as Esperanca with the aim to create a place for children to play and learn before commencing primary school. The CFS's are constructed by local community volunteers and members of the community give their time to teach the children. Plan-TL are interested in exploring new designs for the CFS's that utilise local building materials whilst being durable.

For all construction and infrastructure projects there is a need for them to be sustainable and durable enough to withstand flash floods, monsoonal rains, earthquakes and strong winds.

SUGGESTED PROJECTS

The following infrastructure and construction design projects were identified by Plan-TL and other local community based organisations:

- Innovative uses of local building materials for houses and community centres – sustainable architecture
- Training package for local construction volunteers
- Design of child friendly spaces utilising local materials
- Design of playground equipment using local materials to be used in the child friendly spaces

CONSIDERATIONS

When designing a solution, the following issues have been identified and should be considered a priority. The proposal should:

- Explain measures taken that would help to reduce cost, construction time, and negative environmental impacts.
- Consider factors such as heating and cooling, lighting and the material selection.
- Use locally available materials that are culturally acceptable and environmentally friendly.
- Utilise volunteers from the community for the construction. This means that the design projects should include a training package designed to build the capacity of the local volunteers giving them the required skills for the project.
- The cost of the project should be affordable for the community.

DESIGN AREA 2 - WATER SUPPLY, SANNITATION AND HYGINE (WASH)

Tap stand in Codo, Timor Leste (2012)

PROJECT SUMMARY

Plan-TL has a strong focus on water and sanitation programs in Los Palos and partners with Fraterna, a local NGO, to deliver them.

In general water is sourced from natural springs or bores in the Los Palos district. In the village of Codo water is sourced from natural springs further up the mountain behind the village. The water is relatively high quality with low level calcium carbonate contamination and is piped down the hill to several tap stands around the village. The area around the springs is suffering heavily from erosion and there is danger of the land slipping during the next wet season. The community is interested in ways to stabilise the land to secure the water source and infrastructure that brings the water to the village.

Community members collect water in containers from the tap stand and return with them to their homes for use. While the water is relatively clean at the source microbial contamination can occur through the pipes or from unclean storage containers and so it is common practice to boil the water before use. In addition bottled water is often purchased as it is “faster than filtering or purifying water to drink”.

In addition to water supply Plan-TL and Fraterna are also working on a variety of sanitation programs utilising triggering tools such as community lead total sanitation (CLTS) to change behaviour within communities with the aim of becoming open defecation free (ODF). Currently the most common toilet is the covered pit latrine however there is strong interest in exploring new designs.

All of the water and sanitation projects are currently implemented (including construction), managed and maintained by a group of volunteers from the village. Thus future projects will need to include training for this group of volunteers in the skills required.

SUGGESTED PROJECTS

The following water supply and sanitation design projects were identified by Plan-TL and other local community based organisations:

- Water purification – at the household level to prevent the need for daily boiling and / or purchasing bottled drinking water
- Appropriate sanitation system (e.g. composting toilets)
- New technologies for pumps, i.e. solar as oppose to a ram and rope pump
- Protection of water sources to prevent contamination
- Landslide protection for water sources and pipelines
- Health and hygiene education package for the community
- Drainage infrastructure to minimise mosquitoes
- Water management system to better utilise the water that they have (e.g. distribution of the water, permaculture, fish ponds etc.)
- Flood protection of water sources to prevent them becoming contaminated.

CONSIDERATIONS

When designing a solution, the following issues have been identified and should be considered a priority. The proposal should consider:

- The effect that any chemicals used will have on the environment.
- Cultural beliefs and practices of the people living in the community. In particular many water sources are considered sacred.
- Cost associated with implementing any proposal. The proposals should be affordable for the community.
- Infrastructure already in place for water and sanitation.
- Appropriateness to the local environment and weather
- Utilise volunteers from the community for the construction. This means that the design projects should include a training package designed to build the capacity of the local volunteers giving them the required skills for the project.

DESIGN AREA 3 - ENERGY

New power lines installed in Codo, Timor Leste (2012)

PROJECT SUMMARY

Energy is an ever improving sector throughout Timor Leste. In the late 90s and early 2000s there was wide spread damage to the infrastructure in Lautem including power infrastructure. Power is slowly returning to the district. In Codo new power lines have been installed in the last 12 months and houses have been reconnected. Currently the power within the village is free as the installation of the electricity meters has not yet been connected. With power being free there have been conversions of diesel and petrol generators and motors to run off mains electricity. Members of the community are curious to know if these motors will be cheaper to run off electricity or diesel / petrol once the meters are turned on and they are charged for electricity. There is also curiosity in exploring alternative cleaner energy sources.

Energy required for cooking is another area of conversation. Currently gas powered stoves or open fires are used for cooking. Gas is expensive however and rats are known to chew through the pipelines giving rise to safety concerns. The community is interested in investigating more efficient, sustainable fuels and stove designs for cooking.

SUGGESTED PROJECTS

The following energy design projects were identified by Plan-TL and other local community based organisations:

- Conversion of oil/petrol engines to electricity (e.g. machines used to grind coconut).
- Conduct a feasibility study/sensitivity analysis to determine if it is better to convert to using predominantly electricity, staying on petrol engines or finding another alternative altogether.
- Alternative renewable energy supplies, including alternative fuels.
- Alternative renewable, clean cooking technologies.

CONSIDERATIONS

When designing a solution, the following issues have been identified and should be considered a priority. The proposal should consider:

- The cost of your solution. Including purchasing costs, maintenance costs, payback time, and possibly government subsidies.
- The cost vs. benefit of your solution. Will your solution appeal to the locals, or could you convince a government that your solution is worth investing in?
- The appropriateness of your solution to the social, economic and physical environment in the town of Codo.
- The reliability of the solution.

DESIGN AREA 4 - WASTE MANAGEMENT

Sandals made from recycled car tyres in Los Palos, Timor Leste (2012)

PROJECT SUMMARY

There are no centrally run waste management systems in rural Lautem and so wastes such as plastics, chemicals and human waste are disposed of into the surrounding environment and water ways. Rubbish within communities are sometimes collected and burnt as a way to control it. Organic wastes from households such as food scrapes are fed to the local livestock as most households have chickens, pigs or dogs. Agricultural waste is burnt in the fields to add charcoal back into the soil.

With the increase of consumerism comes the increase of waste. Most consumable items come in single serve packets so that they may be purchased as needed when money is available. This however means that there are large amounts of packaging and consequently large amounts of waste being generated. In particular Rinso (laundry detergent) packets and plastic water bottles can often be found throughout the community.

Recycling is not commonly practiced within the rural areas and recycling facilities are not widely available. There are however some clever examples of upcycling where items are reused to serve a different function. Examples of this include the reuse of plastic PET water bottles to house coconut oil and other liquids and the making of sandals from old car tyres.

In general, the concept of waste management is poorly understood outside of major centres and training is poor. Thus the problems still exists and has become an environmental and health hazard.

SUGGESTED PROJECTS

The following waste management design projects were identified by Plan-TL and other local community based organisations:

- Holistic waste management program
- Natural, biodegradable soap and laundry detergent production to remove chemical pollution from the soaps / detergents themselves and plastic waste from packaging into water ways
- Composting from organic agricultural waste to add value
- Water filtration to stop the burning of wood for boiling or buying of plastic bottles to minimise waste (see also WASH projects for more information)
- Biogas projects from livestock (goats, buffalo, chickens, pigs) manure
- Upcycling waste for alternative materials or products, e.g. sandals from tyres

CONSIDERATIONS

When designing a solution, the following issues have been identified and should be considered a priority. The proposal should consider:

- Current waste management practices.
- Preventing the dumping of waste in communities and waterways.
- Reducing the transportable waste.
- How to incentivise waste management within the community so that it will be self-sustaining.
- The benefits of converting a waste stream into a valuable product which becomes an income stream.

DESIGN AREA 5 - TRANSPORTATION

Traffic on the road from Dili to Los Palos, Timor Leste (2012)

PROJECT SUMMARY

Transportation is an important issue within rural areas. Residents predominantly cannot afford their own vehicle and so public transport use in the form of local buses and mass transport in trucks is prevalent. Public transport, however, is not reliable and road infrastructure is in need of maintenance. Children are required to walk long distances to school which often takes in excess of three or four hours. The community members are interested in alternative design solutions to overcome these challenges.

SUGGESTED PROJECTS

The following transport design projects were identified by Plan-TL and other local community based organisations:

- Cheap alternatives to petrol for fuel supplies
- Cheap form of transport for students to take to get to school
- Training program for mechanics to fix cars

CONSIDERATIONS

When designing a solution, the following issues have been identified and should be considered a priority. The proposal should consider:

- The cost of your solution. Including purchasing costs, maintenance costs, payback time, and possibly government subsidies.
- The cost vs. benefit of your solution. Will your solution appeal to the locals, or could you convince a government that your solution is worth investing in?
- The appropriateness of your solution to the social, economic and physical environment in the Codo area.
- The reliability of the transport solution; in both fuel availability and mechanically speaking.

DESIGN AREA 6 - INFORMATION COMMUNICATIONS TECHNOLOGY

Free public WiFi hot spot in Dili, Timor Leste (Oct 2012)

PROJECT SUMMARY

"The challenge is how do we run ICT programs with within communities with no money and often no access to electricity?" – Jhony Nunes, Plan-TL

Telecommunications infrastructure is widely available in Dili, Timor Leste's capital, with good mobile phone coverage and even a free public WiFi hotspot. Access to infrastructure in the rural areas however is not as widespread. Within Codo there is good mobile phone coverage and most people use mobile phones but there are currently no computers or access to internet within the community, including within the school. Some reasons for the lack of computer technology are the cost, internet and computers are expensive, and that electricity has only returned to the Codo within the last year so that up until recently there was nothing to power computers. There are many communities throughout Lautem however that do not have access to electricity.

The lack of access to computers and the internet in Codo and other communities in rural Lautem has resulted in poor computer literacy throughout the region. Educational programs are required to teach the youth and teachers within the schools how to use computers. There is also no capacity within the community to fix any electronics if they break. In other rural areas across Timor Leste, youth centres have been created to provide training and also WiFi hotspots for the communities use.

Plan-TL is interested in developing electronic data collection systems, such as PoiMapper, that can be used in the field in particular for the WASH program where geographic location of the data is very important. The idea is that photos could be taken, for example of a tap stand in a community, and data collected about that location or point, for example if the tap stand is working or needs repairs, and the type of repairs needed. The limitations with this project are lack of access to mobile internet in the field and the high cost of smartphones. The challenge is to come up with an affordable low cost electronic data collection tool.

SUGGESTED PROJECTS

The following ICT design projects were identified by Plan-TL and other local community based organisations:

- Training to build the capacity or a training centre for youth to gain skills to fix electronics
- Training package for youth and teachers in schools to use computers
- Computer centre that is cheap and can run without connection to mains electricity
- GPS mapping system for data collection (point of interest mapping)

DESIGN CONSIDERATIONS

When designing a solution, the following issues have been identified and should be considered a priority. The proposal should consider:

- How cultural differences might affect the reception of your design.
- Computer literacy is low in rural Lautem and so the incorporation of training will be integral to the success of any project within the district.
- The availability of different types of hardware and infrastructure should be considered, i.e. how many people have access to computers, smartphones, etc.
- Cost should be kept to a minimum so that the design is affordable for members of the community.
- Electricity has only been returned to Codo within the last year. There are still large regions within the Lautem district however that currently do not have electricity. Alternative power supplies or portable power supplies may also be considered as part of the design.

DESIGN AREA 7 - CLIMATE CHANGE

View from Codo, Timor Leste (2012)

PROJECT SUMMARY

The climate in Timor Leste is tropical and can be divided into three seasons, a dry season, a wet season and a transition period in between known as the 'build up'. The wet season starts in December / January and lasts for two to three months. Weather phenomena such as flooding and changes in the durations of the wet and dry seasons have seen climate change become a much discussed topic within the region. Predominantly, the discussion revolves around food security and how mitigation, analysis and post disaster preparation can be improved into the future. As the population grows and floods and large rains during the wet season and longer dry seasons increase in prevalence, this design area is an important step towards increased technology and fresh ideas to negate the impact of such events.

SUGGESTED PROJECTS

The following climate change design projects were identified by Plan-TL and other local community based organisations:

- Flood mitigation projects, e.g. Prevent floods from washing away rice paddies
- Designs for greenhouses to grow a variety of crops
- Plan for climate change preparedness including looking at new technologies
- Plan to measure and analyse the environmental impact or damage from climate change.
- Plan for food security

DESIGN CONSIDERATIONS

When designing a solution, the following issues have been identified and should be considered a priority. The proposal should consider:

- Sensitivity to cultural beliefs.
- The longevity of the solution.
- The ability of the solution to cater for future needs.
- Economic viability to increase early participation.

CONTACT INFORMATION

The EWB Challenge is coordinated by Engineers Without Borders Australia and implemented in conjunction with universities internationally.

Australia and New Zealand

To participate in the EWB Challenge or for general enquires in Australia or New Zealand please contact:

Jenny Turner
EWB Challenge Coordinator
Engineers Without Borders Australia
Email: j.turner@ewb.org.au
Phone: +61 3 9329 1166

UK and Ireland

To participate in the EWB Challenge or for general enquires in the UK or Ireland please contact:

Emily Mattiussi
EWB Challenge Manager
Engineers Without Borders UK
Email: emily.mattiussi@ewb-uq.org
Phone: +44 207 907 4393

All other regions

To participate in the EWB Challenge or for general enquires in all other regions please contact:

Jenny Turner
EWB Challenge Coordinator
Engineers Without Borders Australia
Email: j.turner@ewb.org.au
Phone: +61 3 9329 1166