Development of a water filter in rural cambodia

Parts of the World, Asia

Currently, the villages of Ksach Leav, Koh Khnear, and Puntha Chea do not have constant access to clean water. As a result, CRDT (Cambodia Research Development Team) has requested of Au Fait to design a water filter, to provide the villagers with clean water. Firstly, we will discuss the background of the project, highlighting the major influencing factors and the impacts of change and no change. Secondly, we will discuss five different stakeholders of this project: Working Men, Children, Farmers, Women and CRDT, highlighting how the implementation of the water filter will affect them. Lastly, we will discuss six design criteria and how they effect the project, ending with our conclusion.

Background

Influencing Factors

Climate Cambodia is annually subjected to monsoons. The annual temperature averages around 26 – 31 degrees Celsius and it experiences its rainy season from May through to October whilst its dry season lasts from November until April. Figure 1: Average Monthly Temperature and Rainfall for Cambodia from 1991-2015. This image was acquired at http://sdwebx. worldbank. org/climateportal/index. cfm? page= country_historical_climate&ThisCCode= KHM A direct result of this is the flooding of the Mekong river, which causes all the trash and faeces nearby to be washed into the river further polluting the water (Unicef, n. d). This poses an issue as Au Fait intends for our filters to be used on the water of the Mekong river.

Economic The poverty line in Cambodia is KHR 3, 914 or AUD 1. 32 per day (The World Bank, 2013).

Accordingly, as stated by The World Bank Group (2018), “...the vast majority of families who escaped poverty were only able to do so by a small margin. Around 4. 5 million people remain near-poor, vulnerable to falling back into poverty when exposed to economic and other external shocks.” According to the information above, Au Fait cannot expect any monetary contribution by individual villagers for the purchasing of materials. However, funding can be procured from those who hold power / influence in said villages. Additionally, the villagers can be employed as workforce for the construction of the filter, this will prolong the lifespan of the filters and allow the villagers to construct a new filter when needed.

Cultural According to Marston (2007), “ Traditionally among villagers, men performed menial tasks such as fishing, ploughing, threshing rice, construction and maintenance of tools, and caring for cattle. While the women focused primarily on transplanting seedlings, washing, mending, house cleaning, shopping for groceries and clothes, and performing most of the child care. Women are traditionally responsible for a managing their family’s expenses and engage in small-scale marketing.” Through this Au Fait identifies women as the main operators of the filter. Therefore, the filter needs to be designed according to the physical qualities of near-poor women.

Impact of Implementation

Health and Well-being Impact of Change If the current situation is fixed and the villagers are given a cleaner alternative to the water that they are provided, according to a representative from UNICEF, “ Attention to rural water supply, sanitation, and hygiene will unquestionably deliver results — less child deaths, better learning at school, less disease, more productive workers, less health costs for the people and the system” ,(The Brogan Project, 2016). It has also been determined through scientific studies that consuming adequate amounts of clean water can lead to increased brain function and energy levels, prevent headaches, and increase a person’s physical performance (Healthline, 2017).

Health and Well-being Impact of No Change If methods of acquiring clean water are not implemented, the residents would continue to not obtain safe drinking water and their situation would remain as it is. With Cambodia’s current water issues the residents are currently burdened with many diarrhoeal diseases which are caused by the flooding of the river which then mixes with the waste of the surrounding area (NCBI, 2014). Diarrhoea includes symptoms such as nausea, vomiting, fever, headaches, a loss of appetite (health direct, 2017) and it causes a severe risk of death in small children due to dehydration (better health channel, 2015).

Economic Impact of Change Along with sanitation and hygiene, clean water can help drastically with the eradication of poverty within communities by helping to drive economic growth (World Vision). By implementing a method of obtaining clean water, the residents of the villages could see their economy improved by various factors. By factoring in the before mentioned

health benefits of clean water such as the improved energy levels and increased physical levels, the workers within the community could produce a greater level of productivity and this coupled together with the higher level of brain function could see less mistakes being made thus ensuring a more efficient use of time and resources. The clean water could also be used in junction with the produce grown by the villages to clean it thus removing any germs and diseases that could have been left on their surface due to contamination of the soil during flooding.

Economic Impact of No Change Failure to implement proper methods of obtaining water would see no benefits regarding each villages' economic growth. They would see no improvement in productivity which would see less work being accomplished meaning that workers would be paid less, and businesses would have less products to sell or people would be less inclined to buy produce due to risk of illnesses. This could also lead to a bad reputation meaning any neighbouring communities or visitors to Cambodia would feel less inclined to visit due to the lack of clean water meaning a loss of revenue gained through outside sources.

Stakeholders

Working Men The working men in the province of Kratié are a large group who are affected by the lack of clean water, due to the reasons stated above. This limits them to farming and building with local materials. Thus, being classified as a major stakeholder in the project. The majority of the working men in the Kratié province work as farmers, fishermen and builders. Therefore, clean water is a very important need for them (EWB Challenge

2018). The communities are vulnerable to monsoons and during the rebuilding working men are always needed. The working men in these communities have access to limited tools to build and rebuild, because of this manual labour is very common. The availability and use of power tools and equipment would greatly improve the quality of the work done by these men, and this makes them one of the most important stakeholders (CRDT 2018). In order to increase quality of work, the working men need education and experience, so they can apply it when building the project. Because they are the one building and maintaining the filtering system. If this really is the case, these working men will need a project design simple enough for them to understand and build, so that the population has access to clean water.

Children The effects of drinking unclean water vary by age in Cambodia and while most adults can endure the illnesses caused due to being further developed and having a strong body and a better immunity to the bacteria present in the water, children are not as fortunate. As children are in the developmental stage their immune systems are much weaker which leaves them more vulnerable to diseases caused by dirty water (Open development Cambodia, 2016). The children play an essential role in Cambodia’s future because societies cannot develop without children as they are the ones who will grow up to become workers, farmers and fill various other roles in Cambodia’s work force. Another issue facing children is that their institutes of learning do not all possess adequate drinking facilities as 40 percent of the primary schools in Cambodia do not have access to safe water and hygiene infrastructures. Attention to rural water supply, sanitation, and hygiene will unquestionably deliver benefits for children in the villages such

as less diseases resulting in the death and harm of children, improved attention at school leading to a better education (Free Asia, 2014. p. 4).

Farmers As Cambodia is an agricultural country, more than 80% of the population depend on agriculture (Cambodian Farmers Find Reasons to Stay on the Land, 2017). Based on this, you could say that the farmer is one of the more prominent stakeholders in the villages of Ksach Leav, Koh Khnear and Puntha Chea. As the main personnel in the production of food, farmers occupy a relatively important position and the design for the water filter will bring many benefits to the farmers. The most prominent being health and convenience. Since farmers work in the fields, they do not have a lot of water on site, and due to the long distance between their residence and the farmland, they usually don’t choose to spend time and energy going back home to boil the water to drink. Although boiling water is one of the simplest and most effective way to kill bacteria. there is no equipment and space in the field to allow them to boil water and drink so setting up a filtration system could provide farmers with enough water to keep them healthy and hydrated.

Women Many Cambodian communities still adhere to older customs, which sees women in villages’ still doing most household chores such as cooking food for their family and working alongside their male counterparts as they tend to farms. In fact, a census of Agriculture in Cambodia conducted in 2013 showed that roughly 50 percent of all Cambodians involved in the farming sector happened to be female (CCAFS, 2017). “ No father wants his daughters unsafe just because they don’t have water at home”, (White &

Matt, 2009). By providing women with access to clean drinking water they would benefit from the energy and hydration it would provide thus helping them to better perform their tasks. Although women in Cambodia currently suffer from a lack of gender equality their situation is slowly but surely improving (KHMER Times, 2017), and as their work and study options improve they will rely heavily on their health and wellbeing throughout which would be improved thanks to access of clean water.

Cambodian Rural Development Team One of the stakeholders associated with the project for creating a filtration system for clean water is the Cambodian rural development team (CRDT). Through their continued efforts and various programs, they have established influence in both local governments and communities. They manage this by projects with the intentions of creating viable living conditions that are both sustainable and environmentally friendly. Their overall goal is to wipe poverty and environmental degradation from Cambodia whilst working alongside local communities to encourage participation and ensure longevity for future generations (CRDT, 2017). The Cambodian rural development team can gain possible benefits from this project if it is a success. A positive reception through the improvements could lead to a better community participation and in turn help to spread awareness and information associated with their mission much like their “ Changing Perceptions for Active Biodiversity Conservation in Ramsar Site”, project which draws in crowds to share environmental information through participation in games and songs (www. iucn. org, 2017). a positive image could lead to larger crowds which would allow for information and knowledge to become more widespread.

Design Requirements:

Criteria

Adaptability The criteria of adaptability refer to the solution implemented as it needs to be able to adapt and suit to the various requirements of the population. This is important due to the differences between the communities. If the design can adapt and suit all the requirements and can easily increase or decrease in scale to fit the different requirements of the communities achieving a. If the design is not able to comply with such requirements it will receive the minimum rating.

Availability of Materials and Labour The materials and labour required for building must be local, for lower cost and easy construction, and the design needs to be sustainable and durable. If the design can be manufactured using 60% and more of local materials and labour, then it shall receive a maximum rating. However, if the design is not built of at least 60% of local materials and labour, then it will receive a minimum rating (Trocaire 2016).

Lifespan Lifespan is a very important design criteria, as the design needs to have a long lifespan and maintenance should also be a fast process but last a long time. The longer the lifespan and the cheaper the maintenance the better for the communities. If the design has a lifespan of 10 years or more and a maintenance routine of 5 years or more it will receive maximum rating, but if the design does not comply to the previous requirements it will receive a minimum rating (Marco A. Bruni, Dorothee Spuhler 2018).

Climate Cambodia has a significant monsoon climate which are the dry season is from November to May and the wet season is from May to October (GEOGRAPHY AND CLIMATE, 2018). Two different seasons will cause the river level rise and fall. The river surface will be much wider during the rainy season and will affect the difficulty in designing equipment. Therefore, the river level in different seasons will affect the filtration equipment. Moreover, the leaves in the river will also block the filtration equipment as the seasons change. Thus, the filter device needs to be easily cleaned and free from changes in river level. Filtration equipment should be adapted to the local climate and function properly in any season and can continue to provide local villagers with stable filtered water resources. 3. 5. Training In Cambodia, 80% of the people are farmers and they have not received a good education (Cambodian Farmers Find Reasons to Stay on the Land 2017). Therefore, guidance and training on filtration equipment should be provided. The local villagers should be instructed on the basic principles and maintenance methods of the filtration system, and the equipment should be managed by a special person to complete the training in a short time. And should teach everyone the correct and safe way to use filtration equipment.

Cost The cost of the filtering system is a constraint when implementing the project. First, Cambodia’s average annual income is just KHR 1, 428, 610 or AUD 481. 8 in 2013. Thus, there is a lack of money to buy and build filtration equipment. Another limiting factor is to minimize the maintenance and repair costs of the filtration system. If materials are not available locally, we must scrutinize the cost of transporting them. Based on it, the materials to build

the filter should be as cheap as possible and sold at a price that all villagers can afford.

The Inconvenience of Construction When water filtration systems are built, and pipelines are laid, it is inevitable that they will avoid farmland and even alter the structure of houses. This will affect the normal daily life of villagers as well as some inconveniences in life. Therefore, it becomes a difficult problem to find a proper way to solve the impact on villagers' daily life during construction. If can effectively and reasonably plan the construction time, it will be a good solution, such as when people go out to work, they can build their houses. However, noise, messy construction scenes and inconveniences caused by traffic might not be well resolved.