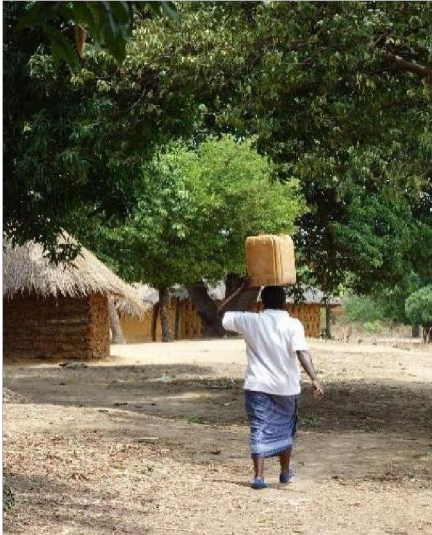


Reach Every Ambition by Developing Yourself

READY Programme 2022-23



Innovations for Sustainable Development

Sustainability, access, and opportunity - 2022 Project Brief

Mayukwayukwa Refugee Settlement, Kaoma District, Zambia

Brunel University 2022 – PDC – Simona Janssen



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'I want to believe that over the next 10 weeks you will draw on your years of education and work hard to come up with some innovative projects, which could positively change the lives of the resettlement community. This is my earnest appeal and request to you.'

*Justin Munyaka, Mayukwayukwa Resettlement Officer,
United Nations Development Programme,
Department of Resettlement,
Under the office of the Permanent Secretary,
Lusaka, Zambia*

Introduction



Mayukwayukwa, one of the oldest refugee settlements in Africa

The 2020 READY programme is delivered in collaboration with UNHCR, the UN (United Nations) Refugee Agency. The programme focuses on the community of the Mayukwayukwa refugee settlement in Zambia.

The Mayukwayukwa Refugee Settlement

The Mayukwayukwa refugee settlement encompasses 16,16700 hectares. It was established in 1966 and is located in Western Province of Zambia, about 75km away from Kaoma District. The Settlement is home to refugees from Rwanda, Angola, Burundi, Somalia, and the Democratic Republic of Congo. **As of 31st July 2022, Mayukwayukwa had a population of 22,524 refugees.**

See demographics below.

Total population demographics Mayukwayukwa as of 31st July 2022						
Age cohort	Female	%	Male	%	Total	%
00-04	1,464	6.5%	1,577	7.0%	3,041	14%
05-11	2,365	10.5%	2,478	11.0%	4,843	22%
12-17	1,464	6.5%	1,802	8.0%	3,266	15%
18-59	4,617	20.5%	5,856	26.0%	10,474	47%
60+	450	2.0%	450	2.0%	901	4%
Total	10,361	46.0%	12,163	54.0%	22,524	100%

The settlement was established in 1966 in response to an influx of refugees fleeing the war of liberation in Angola and is the oldest refugee camp in Africa (UNHCR 2019).

Following a period of peace and stability in Angola, refugees and family members who had fled the country will have their refugee status rescinded as the country is considered safe for return. In 2011, the Government of Zambia pledged to integrate 10,000 former Angolan refugees into the Zambian community, and in 2013 extended this promise to approximately 4,000 Rwandans whose refugee status had recently expired (UNHCR, 2019a). This means these refugees, many of whom had been living in refugee settlements in Zambia for decades, are able to permanently settle in Zambia. So far 10,000 former Angolan refugees have applied and are eligible for local integration in Zambia (UNHCR, 2019c). Local integration involves the provision of five to ten hectares of farmland per family as part of a resettlement scheme. A total of 2800 plots are to be allocated in both Mayukwayukwa, adjacent to the current camp, and a nearby settlement in Meheba (UNHCR, 2019).

Mayukwayukwa UNDP Zambia

As part of their resettlement project, UN agencies held workshops in Mayukwayukwa with local implementing partners and members of the community. The workshops investigated the state of projects and explored ideas around what participants would like to see in the community's future. These discussions form the basis of this 2020 programme project brief – **an outline of the priority issues and opportunities within Mayukwayukwa as identified by residents and those working in the community**. The programme looks at ensuring that the communities living in these schemes are cohesive, productive, sustainable and fully integrated into development initiatives at all levels.

READY, the Programme for innovative global development

The Programme requires students to innovate a product (good and/or service) to help solve problems faced by the Angolan refugees as they resettle in Mayukwayukwa. The programme takes students through the design and planning process of the project cycle and represents a competitive open-ended learning experience where the breadth and depth of product development is left to the students and their teams, against the requirements detailed in the Judging criteria. The students are encouraged to understand the community and develop an appropriate product that represents a solution to a problem that they have identified. The Following criteria and project areas are outlined to help guide the students in their project development. These are just a guide and students are encouraged to be imaginative and original. Mayukwayukwa, one of the oldest refugee settlements in Africa.

Project Design and Business Case Development

In designing your project, you need to develop a business case in order to convince key decision-makers, in this instance the judges, the merits of your product. You should use a business case to explain the problem, identify all the possible options to address it, and demonstrate why your proposed project is worth investing in. The following steps should be taken:

Analysis of the situation

This section describes the situation behind the problem in more detail and how the situation came about. Finally, it provides general projections about potential events if the current situation continues. The conclusion of the analysis should lead naturally to the next section.

The problem statement

This section is a straightforward articulation of the problem that the project is supposed to solve. It also identifies the area or areas where there are issues that need to be addressed, such as inefficiencies, missed opportunities, unacceptable market performance or unfavourable consumer response to a product or service. The problem should define the objective of your project and the overall goal that you expected to achieve (this will be included in your overall impact statement).

Solution options

In this section, you identify potential solutions to the problem and describe them in sufficient detail for the reader to understand them. If, for example, the solution proposed is the implementation of bio digestion, you would define the term and discuss the use of the technology with respect to meeting your objectives and solving the identified project. For most problems, there are possible multiple solutions, you should explore all of these to identify their best qualities in addressing your identified problem and how these have led to your final product design. Is the product design the most appropriate for the community? Take the time to show what alternatives were considered and why you are proposing your design as the most appropriate. The most successful designs are often the ones that are simple in design and are able to be implemented / prototyped rapidly in the community.

Project description and target market identification

This section describes the project, including all the resources required for its implementation (Financial, Physical, Human, Natural and Social), the target market, project budget and a timeline with measurable goals for all project milestones. List any **assumptions** that the reader should be aware of, such as, for example, that government regulations pertinent to the project will not change. You should also list any dependencies, such as completion of other projects or the availability of key individuals. Note any **risks** involved with the project and briefly sketch a plan for dealing with them. In the budget section, include financial projections for relevant metrics such as ROI and total cost of ownership (TCO). You should also include a figure -- usually an additional 15-20 percent of the total -- for scope creep. Identify and describe all stages of the project, including a post project review. Include measurable criteria to determine the success of the project.

Cost-benefit analysis

This section evaluates the costs and benefits for all options, including the proposed solution to the problem and any likely alternatives -- which include, of course, taking no action at all. Illustrate your case with data from similar projects and case studies, if possible. Charts and graphs are often included in this section to illustrate points that are hard to extrapolate from text-based data, so be sure to include as many as will be helpful. The cost-benefit analysis should include the projected financial, social and environmental benefit of your project, a projection of when that payoff is expected, and, in turn, the ongoing sustainability of the project.

Overall Impact: UN sustainable Development Goals

Outline the objectives of your project, the overall goal that you intend to achieve and, in turn, how your product addresses the United Nations Sustainable Development Goals and their targets. For example, a solar light project may address SDG 7 – Affordable and clean energy, target **7.1** By 2030, ensure universal access to affordable, reliable and modern energy services, and SDG 4 – Quality Education, target **4.6** By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy, by providing affordable lighting in schools and the home to promote a sustainable learning environment.

Recommendations

In this section, you make your recommendations for the project and how it is to be conducted. The recommendation for implementation is a brief restatement of compelling results of the cost-benefit analysis and a final statement that you believe the project should go ahead. Articulate the circumstances under which it should be undertaken, including key individuals and actions. Include a recommendation for scheduled re-examination of the project status. If there is any question as to the availability of key resources, make that clear. Include a recommendation for regularly scheduled re-examination of the project status. Refer the reader back to relevant document sections and graphical presentations where it might be helpful.

You need to be thinking Why – What – Where – When – How?

Why is the project needed at this time in this location? Who are the target groups? How and why have these groups been selected? What are the factors of poverty affecting their lives and how do these relate to the Sustainable Development Goals (SDGs).

What specific change is the initiative intended to achieve? What is the anticipated impact on the lives of the beneficiaries? Approximately how many people will benefit directly (from each of the target groups)? What is the anticipated magnitude of the change as defined by the SMART objective of the initiative (e.g. % increase in income or improvement measure of food security from x – y.)

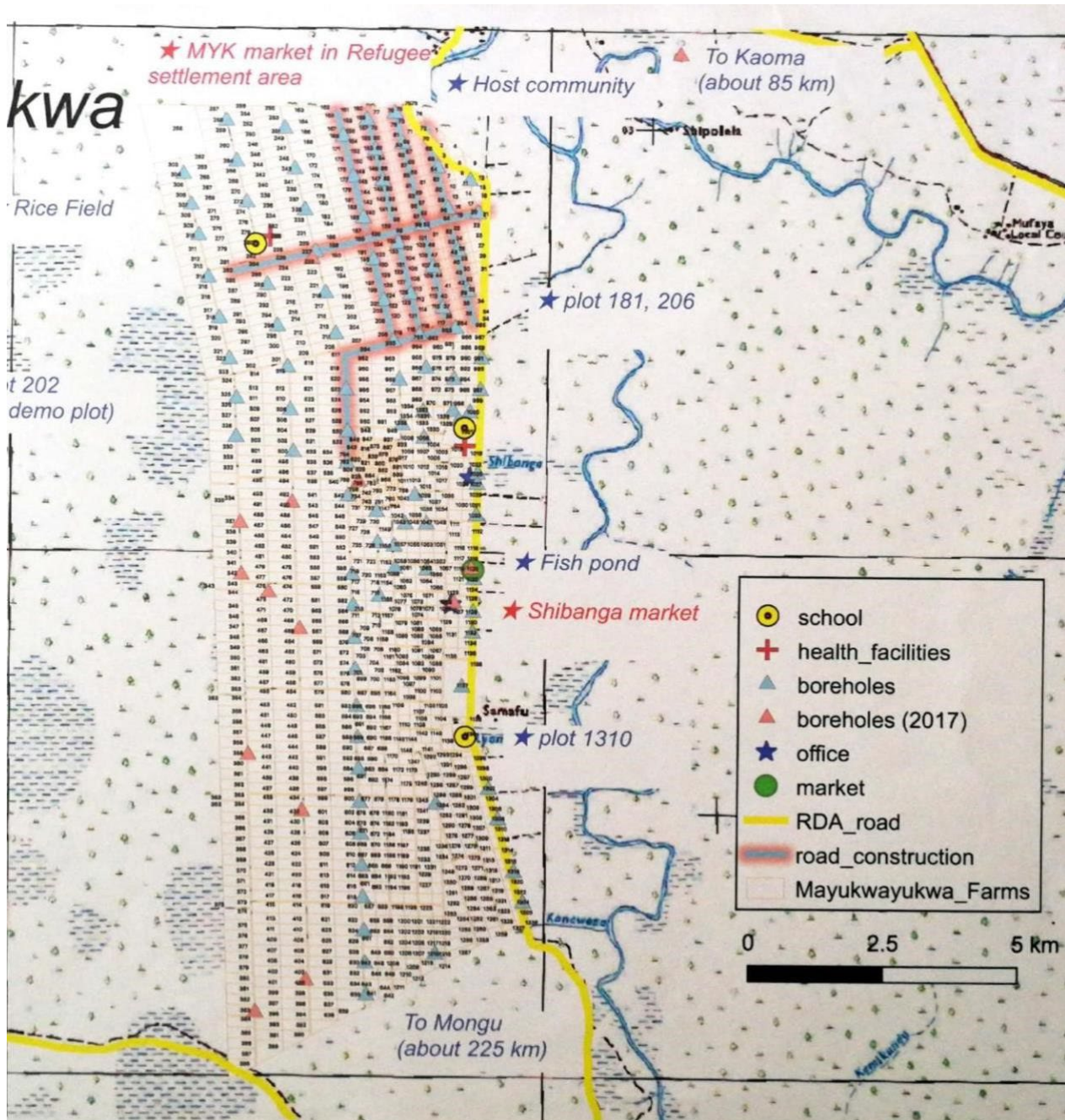
How will the above changes be achieved? Describe briefly the main activities, and how these will lead to the anticipated change.

What evidence exists from past experience to indicate that this approach is the best course of action, and that it is likely to be a success. Refer to other approaches and why?

Who has been involved in the design process so far? Who will implement the project? Which organisations will undertake which work? Why are these organisations considered to be the most appropriate to implement the initiative?

Why do you consider the proposed project to offer good value for money in terms of anticipated results and impact on the economy, vis-à-vis poverty, compared to the overall cost of the intervention? (Cost vs Benefit and sustainability).

Mayukwayukwa Resettlement Scheme Map



Mayukwayukwa Resettlement Scheme Photos



Project Area 1: Water Supply and Sanitation



Water supply and security Innovation Projects

Water supply is a significant issue in the Kaoma district, with 45.8% of people in the region lacking access to safe and clean water for consumption and sanitation (Kaoma District Council, n.d.).

In Mayukwayukwa the community currently relies on groundwater accessed by communally shared boreholes. Household members, most commonly the women and children, will carry containers to and from the borehole where a hand pump allows them to fill these containers with water for their daily needs. There are many boreholes throughout the refugee settlement; however, iron is highly prevalent in the water causing a red-brown appearance, which has resulted in their subsequent abandonment.

Water security is also increasingly becoming an issue in Mayukwayukwa. Previously reliable rainfall patterns are becoming inconsistent (UNHCR, 2019b) (World Health Organisation (WHO), BBC 2020), with reduced precipitation negatively affecting agricultural yields. Some farmers use drought-resistant varieties of crops, however, they still require alternative sources of water as a drought-proofing method.

Innovation Project 1.1 Rainwater Harvesting Systems

Zambia has a monsoonal climate with rains. There is currently no collection and storage of rainwater for the dry season. As a consequence, the community has no alternative supply of water if groundwater supplies are damaged. This project challenges students to design rainwater harvesting systems which will assist the community in drought proofing their farms and provide an alternative source for water in homes, schools and health clinics.



Innovation Project 1.2 Multiple Use Systems

This project will look at designing devices and processes to assist residents with recycling water for multiple uses. The aim will be to reduce the necessity of collecting water from the water points and assist in drought proofing farms and households.

Innovation Project 1.3 Water Supply at the Health Clinics and Health Posts

Currently the health clinics and health posts only have running water supplied to the clinic when generators are operating. Due to the expense of diesel, the generators are only run for a few hours a day. When generators are not running staff must manually collect water from a nearby hand pump and carry it back. The manual nature of this task limits the amount of clean water available in the clinic. This innovation project will look at alternative methods for supplying the health clinic and posts with running water without the need to run the generator.

Innovation Project 1.4 Water Supply for irrigation

While some farmers use drought-resistant varieties of crops, more financially and nutrient rich varieties need more controlled amounts at particular intervals. This project looks at innovating an irrigation system that utilises either the river and/or groundwater to support agriculture productivity and income generation.

Water purification projects

The Department of Water Affairs samples random boreholes in Mayukwayukwa quarterly to ensure the water being provided meets predetermined parameters. Samples are collected and transported to the Kaoma District Hospital for testing by the Health Department. The samples are transported for testing offsite as there is no appropriate lab equipment in the camp.

Water from the boreholes and wells is generally of high quality as it is sourced from underground and naturally filtered by layers of earth. Wells are shallower than boreholes and not machine-drilled, so will therefore often be treated with chlorine at the source. Water from boreholes is not treated. The Department of Water Affairs still encourages residents of Mayukwayukwa to boil their water before use as a safety precaution. Interestingly, while

sandier soils in the resettlement area make agriculture a challenge, they are actually a positive in terms of water quality as the sandy soils provide natural filtration – the water from boreholes in sandy soils is generally good.

Iron is highly prevalent in the water being drawn up from the bores in Mayukwayukwa and the resettlement area indicated by the distinctive taste to the water and visible red discolouration around bore holes. High level iron concentrations may increase the amount of microorganism build up in pipes and in some cases long term exposure to high concentrations of iron may have negative health consequences (WHO, 2008).



Innovation Project 1.4 Purification of Water at a Household Level

Design of a simple, low cost water purification device to purify drinking water at a household level. The filter should use locally available materials where possible and be able to filter water to safe drinking standards. Comparisons should be made to the current method of boiling water.

Innovation Project 1.5 Low Cost Iron Filter

This Innovation Project challenges students to develop a low-cost iron filter to reduce the quantity of potentially harmful iron in the Mayukwayukwa bore water. The filter should use locally available materials where possible and be able to filter water to safe drinking standards.

Sanitation and hygiene

Open defecation is practiced in Mayukwayukwa in locations where pit latrines are not available. In order to improve sanitation, pit latrines are to be constructed in the resettlement area. However, the soil in the resettlement area is sandy and soft and latrines may collapse if their sub-structure is not sufficiently solid. Furthermore, existing pit latrine designs require pits to be dug again annually, requiring significant labour input.



A traditional pit latrine in Mayukwayukwa

Innovation Project 1.6 Improved Construction of Pit Latrines ~

This project will look at improving the design of the pit latrines including the prevention of the pits collapsing when constructed in sandy soil. Students could also consider the possibility of latrine designs which do not require annual digging of the pits.

Innovation Project 1.7 Hand Washing Devices

Hand washing facilities located in close proximity to the pit latrines are not common. This Innovation Project will look at designing simple low-cost hand washing devices that have low water requirements.

Project Area 2: Health and Disease Control



There is one health clinic in the Mayukwayukwa camp that services approximately 8,000 people. The clinic has four qualified staff, 19 support staff and one clinician and sees anywhere from 15 to 50 people per day for a range of health issues, including malaria, diarrhoea, pneumonia, Covid-19 and other services such as child birth, post-natal care and care for those living with HIV.

The clinic relies on solar power and diesel generators for the refrigeration of vaccines and the use of a computer. However, there is currently not enough power being generated to run other appliances, meaning that there is some medical equipment in the lab that cannot be used. An example of the effects of such power shortages can be seen in the water sterilisation techniques used at the clinic. An electric steriliser is available at the clinic, however cannot be run due to insufficient power supplies. Instead, equipment at the health clinics and health posts are sterilised using a fire-powered steamer which is heated over a charcoal or wood fire. The clinic has access to running water, however this is only available when the generator is switched on, which occurs for approximately one hour a day. At other times, water must be collected from a borehole located outside the health clinic. Collecting water using the hand pump can take up to 20 minutes during the dry season and is quite an exerting activity for the nurses.

The camp is situated near a tributary of the Zambezi river that, while providing access to a water supply, represents a major risk factor to contracting major diseases as a breeding ground for disease vector parasites and through the spread of faecal matter, due to open defecation on its banks.

In the resettlement area there is currently a health post that is undergoing upgrades as part of the local integration programme to clinic status to service the new residents moving into the area.

Innovation Project 2.1 Refrigeration of Vaccines Without Using Electricity

The health clinic and health posts have refrigerators for the storage of vaccines and heat sensitive medication. They rely on solar power and diesel generators to run. The solar panels provide limited power and operating the diesel generator is expensive. This Innovation Project will explore the refrigeration of vaccines and medicine without the need for electricity.

Innovation Project 2.2 Alternative Equipment Sterilisation Methods

This Innovation Project will explore alternative energy sources and / or alternative equipment design for the sterilisation of medical equipment.

Innovation Project 2.3 Disease Vector Management

Water borne diseases are a major cause of child mortality in Zambia. Diseases are acquired through eating or drinking of faecal contaminated water, and vector borne acquisition through the bite of an infected arthropod. This project looks to come up with innovative ways to manage the harbouring and spread of disease including Covid-19 throughout the Mayukwayukwa community.

Current Covid-19 situation

- There were over 80 confirmed cases by end of June 2021.
- Community members have had a negative attitude towards Covid vaccination.
- Very few members of staff have been vaccinated.
- Contact tracing is a challenge as family members/friends are not willing to be tested.

Innovation Project 2.4 Using Local Materials for Women's Menstruation Products

Women use chitenges during menstruation, however the cloth used for this purpose is expensive. This project would look at the use of local materials to produce low cost reusable and hygienic menstruation products.



Project Area 3: Education & Vocational Training



Education lies at the heart of a society, creating wellbeing, building democracy and reducing inequality between regions and social groups. The schools in Mayukwayukwa need support in addressing the issues of quality and relevance, and those pushed out of the educational system need alternative opportunity to continue with their acquisition of skills and knowledge needed for future employment. Education and employment serve as a greater social and cultural catalyst through the exposure and contact the refugee will have within a host community, and by default, increase the social links and knowledge of the community.

There are five schools in the settlement, including one secondary school, which opened a few years ago. All schools have limited facilities beyond wooden desks and blackboards. Primary schooling has an education enrolment rate of 57%. Girls are far more likely to drop out of school. It is estimated that approximately 27% of females in rural areas have no education compared to 18% of males. Pregnancy, early marriage and poverty are intrinsically linked and are the main challenges girls in Zambia face in staying in school. However, inability to pay school fees and a need for households to send their children to work is also a contributing factor.

Attraction and retention of qualified teachers for provision of quality education is low at 54% (44 trained teachers out of 82), which compounds the already high pupil teacher ratios, resulting in low learning achievement scores across the board (UNHCR, 2019; MESVTEE, 2019).

Innovation Project 3.1 Classroom Development

The classrooms only have basic furniture and equipment. There is limited or no funding available. This innovation project will explore options to provide improved classroom equipment to help improve both the teaching and the learning capabilities within the schools.

Innovation Project 3.2 Student Retention

With many children dropping out of school, this project will explore the main courses and innovate ways of encouraging school attendance.

Innovation Project 3.2 Vocational Training

Those pushed out of the educational system need alternative opportunity to continue with their acquisition of skills and knowledge needed for future employment. This innovation project will develop a product or service that will cater for the needs of school leavers.

Innovation Project 3.3 Computers in Schools with Limited Electricity and Money

This project will look at design ideas for having computers in schools with limited electricity and money.



Project Area 4: Business & Livelihood Development



Full-time, permanent work for cash wages is extremely uncommon among the Angolans in Zambia, the majority currently rely on casual labour, or “piece work” as they refer to it, to supplement the crops and cash they get from farming. These casual labour opportunities are usually in the form of farm work, weeding, digging, chopping trees, or light construction.

Without access to stable cash income, Settlement families must often prioritize short-term needs, like finding their next meal, over long-term investments in income-generating activities. They face constant risks like local market fluctuations, extreme weather, or other shocks, which can destabilize a vulnerable family and prevent them from engaging in a productive activity

Access to credit has the potential of strengthening self-reliance by moving individuals out of subsistence farming to producing cash crops, or by providing them the means to start businesses. In Mayukwayukwa there are no current credit schemes available to the Angolans. Household access to credit and a livelihood portfolio would enhance the Angolans’ self-reliance and better support their integration into Zambia.

Innovation Project 4.1 Livelihood Development

This project will look at all the other Project Areas and will develop a service to help the Angolan refugees develop their semi-substance activities into a stable cash income. This project will need to address access to credit, supply chain linkages and supply versus demand. This is an incredibly important project area involving a cross section of UN agencies and is key to project sustainability. “The overall objective of the assignment is to identify effective, existing or upcoming livelihood initiatives or socio-economic (with the emphasis on economic self-reliance) projects that can support the implementation of the Local Integration Strategy. This includes the identification of new partners, including development actors, the private sector etc.”



Project Area 5: Agriculture and Food production



Climate change is becoming a significant challenge in Mayukwayukwa. There have recently been fluctuations in the timing and duration of the wet season in Zambia, leading to a drop in long-term average rainfall in the Kaoma region from 1000 – 1100 mm to 850 – 1000 mm (UNHCR, 2019b). This has had a negative impact on the yields of various crops and raises concerns for food security into the future (UNHCR, 2019b). As the majority of the former refugees are subsistence farmers, they are particularly vulnerable to changes in climate.

The former refugees who move to the resettlement area under the Local Integration Program are finding farming this land challenging as the soil is quite depreciated. Groups such as the Ministry of Agriculture and Livestock and Concern Worldwide are working with the farmers to share improved farming techniques that will increase soil fertility and water retention. These improved farming techniques include the principles of conservation agriculture, which are currently being shared through farmer cooperatives, 'farmer field schools' and study circles.

Innovation Project 5.1 Improvement of Soil Quality

This project will focus on improving the soil quality of farming areas to increase yields and quality of crops. This is of particular importance in the resettlement area where the soil quality is poor and mostly sand.

Innovation Project 5.2 Pest Control

This innovation project will look at the development of natural, environmentally friendly pesticides using locally sourced ingredients and or strategies for pest control on farms.

Innovation Project 5.3 Design of Efficient Farming and Horticultural Equipment

This project will look at simple, low cost designs for manual farming equipment to increase the ease of use and efficiency.

Innovation Project 5.4 Horticulture and Crop Diversification

The need to diversify the crops grown in the area has been identified to ensure that the local diet contains a balance of the required nutrients for healthy living. This Project Area will look at strategies for crop diversification.

Innovation Project 5.5 Drought Proofing Farming Methods

This Project Area will look at drought proofing farms in order to minimise the impact of changes to the wet season, including irrigation and hydroponics.

Innovation Project 5.6 Environmental Management and Sensitisation Programmes

This project will focus on the development of environmental management and sensitisation programmes for farmers and community members, particularly in relation to deforestation and natural resource management.



Project Area 6: Food Processing Minimising waste



In Mayukwayukwa, crops tend to be eaten fresh and in season, with minimal processing.

The main crops currently being grown are sorghum, millet, cassava and maize, with drought-tolerant varieties favoured (UNHCR, 2014). Small amounts of beans, soya beans, groundnuts, rape, cabbage, and tomatoes are also being grown (UNHCR, 2014).

Mayukwayukwa has a large yearly harvest of mangoes, however most of these go to waste. This is because there is a limited market for the sale of excess produce and there are currently no systems in place for the storage or preservation of mangoes. This is both a missed opportunity for economic development, but also limits food security in the region.

Opportunities for economic development in this area are also limited by access to markets. Former refugees in Mayukwayukwa have little access to markets for their goods, as the major markets which are accessible to them are located in the current refugee settlements, where the population tends to have limited disposable income (UNHCR, 2014).

Innovation Project 6.1 Strategies for Bulking Centre

This project will look at ideas for the strategy management bulking centre in the resettlement area. This may also include looking at models for cooperatives to have higher negotiating power for the price of the products produced, supply chain linkages and produce distribution.

Innovation Project 6.2 Food Preservation Technologies

Food is generally consumed when it is fresh. This results in large amounts of food being wasted if it cannot be consumed or sold in the markets before it spoils. This Innovation Project will look at the design of equipment and methods for preserving food. This may include, but should not be limited to, drying and making of jams / preserves or refrigeration technologies that do not require electricity.

Innovation Project 6.3 Food Processing Technologies

This Innovation Project will focus on food processing technologies to add value to food by transforming it into other products. For example, this could include the design of efficient hammer mills to process maize and cassava into flour without the reliance on diesel generators, as is the current design. Other products that may be investigated are the processing of groundnuts and honey.

Innovation Project 6.4 Food Packaging and Product Development

The large losses from farm to plate are attributed to poor handling, distribution and storage of produce. Losses at almost every stage of the food chain may be reduced by using appropriate packaging. Packaging is an essential part of a long-term incremental development process to reduce losses. This project looks at the processing and packaging of food produce into a marketable product that could be sold not only in Mayukwayukwa but throughout the country.



Project Area 7: Energy Supply



In the early 1990s, a 24 kW micro-hydroelectric generator was commissioned by the Zambian Commissioner of Refugees to improve the energy supply situation in the Mayukwayukwa settlement. The microhydroelectric generator supplied electricity to Mayukwayukwa for over 20 years until a gearbox failure in 2011 prevented it from further operation. The refurbishment of the turbine is on hold due to funding limitations. While it is noted that restoration or replacement of the existing hydro turbine is a high priority for Mayukwayukwa, this project is not suitable for the Programme as the limiting factor is solely funding rather than new designs.

With the hydro turbine not working, the main sources of energy are diesel generators and solar panels. Due to the high cost of diesel, generators are used sparingly, and existing solar panels are often not sufficient to meet power needs. For example, the solar panels do not provide sufficient electricity to run some equipment within the health clinic.

While the health clinic and schools struggle with the capacity of the generators and solar panels, households and small businesses do not have access to these, and struggle with basic power supply for even simple lighting or phone charging, relying on kerosene lamps and daylight for homework and business.

Innovation Project 7.1 Alternative Energy Supply

This project will focus on designs to supplement the existing diesel generators and solar panels using a cheap, reliable and alternative energy source. Areas of high priority for increased energy capacity include the high school, health clinic, health posts and market areas.

Innovation Project 7.2 Low/No-energy Technology Solutions

While the dream of access to energy for all is the ultimate aim, the innovation of low and/or non-energy technology is part of the sustainable solution to bring communities out of poverty. This project involves the exploration and innovation of products that would greatly benefit households through their limited need for/or generation of energy. For example, households would greatly benefit from access to simple sustainable energy solutions for lighting, cooking, charging mobile phones, refrigeration and general livelihood development. This area cuts across many of the other project areas.

Energy for cooking

Cooking in Mayukwayukwa is predominantly done on stoves fuelled by firewood or charcoal. The large volumes of these fuels being used for cooking is causing deforestation in the area, which community members are aware of and quite concerned about. The collect

Innovation Project 7.3 Fuel Efficient Stoves

Design a stove that will reduce the amount of firewood and charcoal required by a cook stove. The project could also include exploring alternative fuel sources for cooking.



Project Area 8: Shelter



With the resettlement of former refugees will come the construction of permanent accommodation through the 'Roof Over the Head' program coordinated by UNCHR's implementing partner Habitat for Humanity. Former refugees who have been given a plot of land in the resettlement area will be supported to construct a shelter on this land.

Through the 'Roof Over the Head' program, Habitat for Humanity provides the roof and structural support for a shelter using durable materials such as steel poles in reinforced concrete and corrugated iron. The household is then responsible for filling in the walls of the structure to create a home.

Current housing in the refugee camp is largely temporary and of a lower standard. Shelters generally consist of two rooms, which accommodate families of six or more. There is inadequate space for self-isolation, in case of covid-19 infections. Houses are small with poor ventilation. The shelters are made of wood poles and mud, with grass roofs that require annual replacement.

There is an ongoing issue of termite infestation in the existing shelters of Mayukwayukwa.

There is a recognition that the current design for resettlement shelters will be too small for a typical family in Mayukwayukwa and so they were designed to be expanded upon by the household over time.

Innovation Project 8.1 Improvements to Shelter Designs for the Resettlement Area

This Innovation Project will explore the incorporation of local materials and designs for completing walls and additional rooms in that add on to the roof over the head model currently being implemented in the resettlement area. The designs will focus on the incorporation of local materials and a short construction time.

Innovation Project 8.2 Alternative Methods for Utilising Local Materials in Construction

Alternative construction methods will be explored in this Innovation Project to improve the durability and reduce maintenance required for shelters built with local materials.

Innovation Project 8.3 Termite Proofing Homes and Buildings

Termites commonly cause damage to shelters and infrastructure in the area. This project will look at methods for termite proofing shelters and infrastructure.

Innovation Project 8.4 Recreation Facilities in the Resettlement Area

This Innovation Project will look at designs for low cost construction of recreation facilities and playground equipment for children using local materials.

Innovation Project 8.5 Accommodation for Health Workers at the Clinics

There is a shortage of skilled workers at both the health clinics and health posts. The construction of accommodation for health workers is expected to aid in attracting workers to the clinic and health posts. Having means for health workers to stay on site will also increase the ability of the clinic and health posts to respond to emergencies, as people will not have to wait for the health workers to travel from their homes after hours. This Innovation Project will look at the design and construction methods for accommodation at the health clinic.



Project Area 9: Transport



Given the large distances between homes and key services in the resettlement area, the establishment of viable transport solutions for the former refugees is vital.

New roads are currently being planned and built in the resettlement area. The roads that currently exist in the refugee settlement are sand-based, making them difficult to construct and maintain. Moreover, the roads can be difficult to drive on during dry conditions due to soft sand and may become impassable during the rainy season.

The primary modes of transport are by bicycle or on foot. The development of public transport solutions would be hugely beneficial to the former refugees.

As a primarily agricultural society, the people of Mayukwayukwa also require the ability to transport farming produce and other goods over long distances. Currently, a cart drawn by two or four oxen is a common form of transport. These carts can be hired from their owners at a cost for such tasks as taking goods to the market

Innovation Project 9.1 Public Transport Solutions

There is a need for public transport infrastructure in the resettlement area where there are large distances between homes, communal infrastructure and services. This Project Area will look at low cost public transport devices and programmes.

Innovation Project 9.2 Transport of Goods and Produce

This Project Area will look at the design of non-motorised transportation devices for transport of farm produce and other goods. The sandy nature of the soil in the resettlement area and some parts of Mayukwayukwa should be taken into consideration.

Innovation Project 9.3 Mobility Devices for Those with a Disability

Disabled people and those with ailments that inhibit mobility do not have access to assistive devices for enhancing the personal mobility. Providing mobility devices that are appropriate and well-designed not only

enhances mobility, but also opens up a world of education, work and social life for those in need of such support.



Project Area 10: Solid Waste Management

Waste management is a major issue in Mayukwayukwa. There is currently no person or group in charge of waste management and many inhabitants are unsure of where to dispose of their waste. This has resulted in the frequent throwing of solid waste into the bush. To counter this, bins were installed in the local market, however market attendees rarely use these.

As part of the Local Integration Program, a program will be implemented to inform former refugees of the importance and methods of proper waste disposal.

There is currently little organised recycling or reuse of waste materials in Mayukwayukwa, resulting in the disposal of large quantities of recyclable solid waste.

Organic waste management is also an issue. As a largely agricultural community, Mayukwayukwa produces large quantities of organic waste that is currently not being utilised as a source of compost or fuel.



Innovation Project 10.1 Organic Waste Management System

This Project Area will look at a system for managing organic waste produced by households and agriculture. This may include the investigation of composting systems and biogas.

Innovation Project 10.2 Solid Waste Management System

This Innovation Project will look at ideas for solid waste management systems.

Innovation Project 10.3 Recycling or Up-Cycling Projects

There are no formal recycling programmes in the area. This Innovation Project will look at ideas for recycling programmes in addition to investigating up-cycling, or transforming waste into useful products. This is a highly creative project area that can result in the design and development of fantastic transformative products such as bags, greenhouses, building blocks and shoes.



Project Area 11: Information Communications, and Technology



Mobile phone coverage in Mayukwayukwa is provided by Airtel, a common mobile service provider in Zambia. The tower covers an approximately 15-25 km radius, but does not include a large area of the resettlement area. This lack of coverage impedes not only day-to-day communication, but also communication during emergencies in the area. Given the large distances between properties in the resettlement area, an effective form of communication within the settlement is of great importance.

Innovation Project 11.1 Community Radio

This project will be focused on developing design ideas for a community radio station. The limited power available in the area should be taken into consideration.

Innovation Project 11.2 SMS Based Communication Systems

Design an SMS system for the communication of government and NGO messages, such as announcements from health workers on vaccination programs. SMS based communication systems could also be used by the community to check agriculture prices and to raise the alarm to get assistance in an emergency.

Innovation Project 11.3 Computers in Schools with Limited Electricity and Money

This project will look at design ideas for having computers in schools with limited electricity and money.

Innovation Project 11.4 Wireless Internet Hotspots

This project will look at design ideas for a wireless internet hotspot. This may include a communal space with power for charging mobile phones.

Innovation Project 11.5 Education and Livelihood Development Apps

This project would look at developing a simple and appropriate phone application to support learning or business activities in the community, from learning maths for children through to market price updates for farmers.

What Is Sustainability?

Sustainability focuses on meeting the needs of the present *without* compromising the needs of future generations.

The concept of sustainability is composed of three pillars:

- Economic
- Environmental
- Social

Informally known as profits, people and planet.



UN Sustainable Development Goals by 2030



SUSTAINABLE DEVELOPMENT GOALS

17 GOALS TO TRANSFORM OUR WORLD



This Agenda is a plan of action for people, planet and prosperity. It also seeks to strengthen universal peace in larger freedom. We recognise that eradicating poverty in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an indispensable requirement for sustainable development. All countries and all stakeholders, acting in collaborative partnership, will implement this plan. We are resolved to free the human race from the tyranny of poverty and want and to heal and secure our planet. We are determined to take the bold and transformative steps, which are urgently needed to shift the world onto a sustainable and resilient path. As we embark on this collective journey, we pledge that no one will be left behind. The 17 Sustainable Development Goals and 169 targets demonstrate the scale and ambition of this universal Agenda. They seek to build on the Millennium Development Goals and complete what these did not achieve. They seek to realize the human rights of all and to achieve gender equality and the empowerment of all women and girls. They are integrated and indivisible and balance the three dimensions of sustainable development: the economic, social and environmental.

The Goals and targets will stimulate action over the next fifteen years in areas of critical importance for humanity and the planet:

People

We are determined to end poverty and hunger, in all their forms and dimensions, and to ensure that all human beings can fulfil their potential in dignity and equality and in a healthy environment.

Planet

We are determined to protect the planet from degradation, including through sustainable consumption and production, sustainably managing its natural resources and taking urgent action on climate change, so that it can support the needs of the present and future generations.

Prosperity

We are determined to ensure that all human beings can enjoy prosperous and fulfilling lives and that economic, social and technological progress occurs in harmony with nature.

Peace

We are determined to foster peaceful, just and inclusive societies which are free from fear and violence. There can be no sustainable development without peace and no peace without sustainable development.

Partnership

We are determined to mobilize the means required to implement this Agenda through a revitalised Global Partnership for Sustainable Development, based on a spirit of strengthened global solidarity, focussed in particular on the needs of the poorest and most vulnerable and with the participation of all countries, all stakeholders and all people.

The interlinkages and integrated nature of the Sustainable Development Goals are of crucial importance in ensuring that the purpose of the new Agenda is realised. If we realize our ambitions across the full extent of the Agenda, the lives of all will be profoundly improved and our world will be transformed for the better.

With just 10 years to go, an ambitious global effort is underway to deliver the 2030 promise—by mobilizing more governments, civil society, businesses and calling on all people to make the Global Goals their own.



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