

2022 Praxis III Showcase: Projects

"Work on a multidisciplinary global, virtual team to clarify a community/stakeholder-identified opportunity (from a non-local context) and proposing a verified and validated design (supported by a context-appropriate high-fidelity prototype system) to resolve the opportunity."

EngSci students in Praxis III are presented with the above challenge. They work with global stakeholders and virtual peers (business students from Georgia State University) to accomplish their goals.

We've gone global!

Engineering Science students in Canada worked closely with business peers from the United States, on projects based in Ghana, Nigeria, South Africa, Uganda, and Thailand.

Read about this year's projects

AERLIFT	2
Closing the Loop	3
COLLECT3R	5
Eggs in Many Baskets	7
Keep on Track	8
Making Health Services Accessible	9
Potential of Recycled Plastics and Recycle Right	10
Safe Water for All	12
Say Cheese	14
Smell the Patchouli	16
The Bamboo Weavers	18
The Wandering Sheep	19

AERLIFT

Location: Democratic Republic of Congo and Malaysia

Provider(s): Nathaniel Andrego, Ryan Tam



View of drone cargo area from below

Nearly 3 billion people live in rural areas where access to healthcare services can be limited. In developing regions with poor ground transportation infrastructure, people may need to walk for hours or even days to a nearby healthcare facility equipped to serve their needs. Aerlift is currently working with governments and NGOs to deploy autonomous drone delivery networks that will increase healthcare access for these remote communities. Healthcare workers use their software platform to easily order items which are then delivered on-demand by drone. It also facilitates the collection of valuable healthcare data, assists in inventory management, and overall helps the government plan its healthcare programming more effectively.

Aerlift will be piloting its first deliveries in 2022. The drone is designed to carry items like medication and vaccines. These items are packaged into the drone at a main hospital and then winched down and delivered to a remote clinic. For this, Aerlift is interested in designs for the packaging for medical goods that will be delivered by drone. Certain items require thermal considerations. On top of physical constraints such as weight, size, durability, etc. Aerlift values life-cycle considerations such as reusability, ease of use, and cost. Lastly, the context providers indicated that they envision multiple options for different use cases.

Closing the Loop

Location: Accra, Ghana

Provider(s): Kweku Attafuah-Wadee



Waste management in Ghana is not often guided by policy and mandates. As most waste goes into landfills, developing countries like Ghana needs more data to understand how recyclable materials can be kept in circulation as much as possible. Currently, waste collectors aggregate their findings and sell it to informal intermediaries. This transaction is often interwoven with power and gendered dynamics, lack of insights on pricing, proper understanding of plastic quality control, and deceit through adding extra weight to waste. Informal waste collectors, depending on the financial return from their activities, may engage in other activities. Per anecdotal evidence, these other jobs tend also to be informal and require technical and/or non-formal skills (e.g., construction, animal husbandry, masonry, etc.)

Other materials that are recycled in Ghana include paper, cardboard, metals, and electronic waste. Out of these, only metal waste recycling arguably has the most economic value currently. There is a relatively strong demand for recovered metals, driven partially by the construction sector. The recycling of other non-plastic waste streams is mostly done informally and with rudimentary technology with major negative environmental implications, particularly e-waste burning. In terms of their relative economic value, with the exception of e-waste recycling, there is a high degree of uncertainty, mostly due to the limited number of studies on the matter and the lack of major government involvement.

Low income communities engage in generally two classes of activities when managing waste. The first involves proper waste disposal. In some communities, the local authorities provide vantage points with waste disposal skips. For a small fee, residents are allowed to dispose of their waste. Additionally, informal waste collectors also provide waste collection services to residents, sometimes including segregated collection of plastic waste.

Waste aggregator stations differ from landfills because whereas the former acts as a transitory point whereby different waste streams are segregated for subsequent transfer to end market

buyers, the latter typically acts a final destination for collected waste. Though waste aggregator stations can have different ownership arrangements, in Ghana they are all privately owned, with support provided by the government in securing sites.

The destination of segregated waste from waste aggregator stations depends on the waste stream. Usually the waste streams with relatively strong demand in Ghana are plastics, metals, and organic waste. Plastic waste is typically either baled for export to recyclers in Europe and Asia or pelletized locally for consumption by either local and foreign plastics manufacturers. NB: plastics waste usually comprises either PET, HDPE, and PP plastics. Scrap metals recovered at waste aggregator stations include aluminum, iron, copper, lead, and steel. They are typically sold to local industries in Ghana or exported.

In Ghana, most times, bias occurs when the market value of waste is negotiated. Also, due to lack of mandates, manufactures requiring plastic do not need to use recovered waste for their products. To inform policy, data is needed to understand the throughput of the waste cycle as it moves from the waste collectors, aggregators and back to the economy. Through informed understanding of the current situation, lobbying of state-wide policies can be put forward to implement initiatives that has wider and transparent impact for communities.

In term of policy mandates, there are currently two government policy documents specifically addressing recycling in Ghana: [National Plastics Management Policy](#) and [Hazardous and Electronic Waste Control and Management Act, 2016 \(Act 917\)](#). They deal with the recycling of plastics and e-waste, respectively.

Kweku is seeking sustainable solutions that can increase and monitor the throughput of recyclable materials. He thinks Accra, Tema, and Kumasi are ideal locations for conducting projects related to resource management as they present a variety of socioeconomic scenarios that can be explored (e.g., low-income areas and urban slums, mixed income communities, urban farming and animal husbandry, commercial and institutional operations, industrial operations, etc.

COLLECT3R: A Sustainable Framework to Expand the 3R's of Solid Waste Management in Municipalities of Bangladesh

Location: Gazipur, Bangladesh

Provider(s): Nitish Sarker and Ahmed Mahmoud



*Two informal waste pickers with a typical waste collection van that is used for accessing narrow roads of city neighborhoods in Bangladesh
(Image Courtesy: BRAC)*

Solid waste management is a critical challenge for most municipalities in South Asia, and the problems range from lack of standardized policies to arbitrary waste collection systems as well as the failure to persuade people to separate recyclables from garbage. These issues trigger extensive negative externalities on public health, environment, economy, and sustainable living standards of people residing in those communities. Bangladesh, the most densely populated country in South Asia, produces approximately 25,000 tons of solid waste daily, and more than 60% of these wastes come from urban areas. The existing waste collection infrastructures in urban areas of Bangladesh are run mainly by informal sectors, such as community-based organizations, NGOs, etc., due to the insufficient capacity of municipal authorities. After collecting wastes from the households, the wastes are often crudely dumped beside roads, open fields, lowlands, and water bodies by local waste pickers for municipality-run trucks to transport them to waste processing facilities and landfills. On average, this hybridized waste management infrastructure can handle only 55% of the daily urban waste. Practically, this system is even more inefficient since most wastes are not separated. The organic-inorganic and garbage-recyclable wastes get mixed at the household level or the local dumpsites leading to severe environmental, health, and economic loss.

The Department of Environment in Bangladesh has identified the critical issues associated with this challenge. It developed a national 3R (Reduce, Reuse, and Recycle) strategy for waste management and minimizing relevant environmental issues. Several pilot projects were tested as a part of the 3R strategy development, which included but was not limited to small, medium, large-scale composting and recycling programs, waste separation at the household level, clean energy from waste (biomass-based power generation), etc. Although these projects demonstrated significant potential, the 3R strategy did not really take off among the citizens, industries, private sector, NGOs, and other stakeholders. This is primarily due to the lack of an integrated and sustainable framework to standardize the domestic waste collection programs, i.e., once the wastes get mixed at the household level (and then at the local dumpsites), reusing or recycling of those materials become either impossible or too expensive for the municipalities or other third-party industries. Moreover, the ‘we dump – they collect’ attitude of the residents and ‘non-recognition’ of the informal sector service providers (e.g., the waste pickers) need changing. An integrated, data-driven waste management system featuring – public, informal sector, and municipality partnerships, raising civic awareness for source separation of wastes (via apps, social media, and educational institutions), separated waste collection and transportation to modular and safer local dumpsites, encouraging (and enabling) local recycling and composting entrepreneurship, and solid guidelines for managing these actions (e.g., ‘no separation–no collection’ policy, e-waste buyback programs, formal training, and financing local waste pickers) – should be prioritized to expand the national 3R strategies.

Nitish Sarker and Ahmed Mahmoud are working on a collective solid waste management framework – COLLECT3R – for Bangladesh, especially targeting the Gazipur city corporation area for a pilot-scale study. It is a major industrial city in Bangladesh and is located only 25 km north of the capital city Dhaka. Gazipur city corporation area has a total population of 4 million (mostly living in low-income dense neighborhoods) with poor waste management systems. The socio-economic scenario of the Gazipur city corporation area is representative of many communities in the municipalities of Bangladesh, including Dhaka. Thus, the COLLECT3R pilot project would simultaneously focus on (a) changing the ‘we dump – they collect’ behavior of the residents and promoting source separation of residential wastes, (b) a modular source-separated (organic/inorganic) waste collection and transportation arrangement, and (c) data collection and monitoring the key performance indicators (KPIs) to evaluate the project’s success. Based on previous pilot studies, education and hands-on training of citizens and informal waste collectors are essential for promoting behavioral change. Nitish emphasized that hands-on interactive tutorials on waste sorting for students/parents at educational institutions would be a good starting point for local community outreach. Additionally, he is interested in developing app-based (or social media-based) knowledge transfer and gamification or rewarding strategies for promoting proper waste separation practices. Simultaneously, adoption of modular and motorized waste collection tuk-tuk vans (preferably, electric-run, not diesel) instead of existing human-paddled vans, optimization of waste collection routes and schedules, and development of local inorganic waste sorting facilities (e-waste, recyclable, etc.) would significantly boost the efficiency and performance of the municipal waste management system.

Eggs in Many Baskets

Location: Lagos, Nigeria

Provider(s): Hycienth Okonweze

Challenges of food insecurity and hunger worldwide and in developing countries like Nigeria have continued to receive attention from experts and governments. . Several conferences and World Food summit on human nutrition have brought to the fore deliberations on issue of eradicating poverty and hunger. FAO (1995) asserted that, the most critical in the global food basket crisis is animal protein. In Nigeria, the major source of animal protein is the livestock industry.

Poultry production as an aspect of livestock production is important to the biological needs, economic and social development of the people in any nation. The development of the poultry industry has also been described as the fastest means of bridging the protein deficiency gap prevailing in most developing countries. Despite the importance of poultry production, it is characterized by low production level due to limited finance for the procurement of basic poultry equipment, materials and feeds. The result of this is that many of the small-scale poultry farmers are not encouraged to increase their production.

In poultry production, small-scale poultry production represents one of the few opportunities for saving, investment and security against these risks. It accounts for approximately 90% of total poultry production. Annually, small-scale poultry farmers lose a significant part of their egg production due to glut - excessive unsold eggs despite an existing surplus demand. Since school children are a major consumer of eggs, this glut typically happens at the times of the year when schools are on holidays and mid-term breaks. It is also seen during major national holidays. Small-scale poultry farmers sell eggs in its original state because they do not have refrigerating capacity to increase the shelf life of the eggs beyond a month, neither do they process the egg in any form to increase its shelf life.

Hycienth, our local context provider, is representing Shoresand Farms. This initiative seeks to help struggling small-scale poultry farmers by seeking a small-scale solution to process and package raw eggs, say 2000 – 5000 raw eggs daily, into egg powder and liquid pasteurised egg that will ensure longer shelf life and less storage space.

Keep on Track

Location: Uganda (multiple locations)

Stakeholder: Muyambi

Cycle Connect's mission is to increase income for smallholder farmers in East Africa through productive asset-financing and training. Through a unique blend of assets, inclusive financing, and training the team connects farmers to the necessary tools to move forward. Loans are purposefully designed with the benefit to the farmers. While other financial institutions prioritize profit, Cycle Connect focuses on giving loans that have a direct impact on the farmer's ability to increase income over time, using products that are fully vetted, tested, and piloted. A large majority of farmers are deep rural, with limited means of accessing traditional financial services. Cycle Connect's customer service model is fully focused on going to them – which means getting to know their community, collecting payments in-person, hand-delivering the assets, and being present to train and troubleshoot.

Assets are given to a group of farmers to ensure accountability and follow the Grameen bank's Circles framework. As assets are handed over to farmers, who are paying for them in installments, there is a need to track these assets to overcome false lost claims and understanding how the equipment is used. The assets, e.g., motorbikes, grinders, etc., are usually bought at competitive wholesale prices to pass on the benefits to the farmers. Farmers use mobile money to pay back their loan installments to Cycle Connect.

Out of the asset inventories, cycles, motorcycles and ox & plough are lost the most. Loss claims are through the clients engaging with the field loan officers. The clients also report to local authorities. Regarding malfunctioning assets, it depends on the issue. For normal wear and tear, the clients must repair the asset themselves. Cycle Connect would only be involved if the cause of the malfunction is somehow related to the manufacturing of the product.

Muyambi thinks that the most important need is tracking the location of the assets. Tracking would also provide some use metrics. For example, how long is the asset used per day, how often. In the end, it would establish the useful life and economic value of an asset. This data can be shared with donors and used in grant proposals as an indication of the developmental impact our products have. Tracking would be key throughout the life of the asset because no matter when an asset is lost, Cycle Connect stands to lose a lot.

Making Health Services Accessible

Location: Nigeria

Stakeholder: Tolulope Oginni

E-Health Africa's (eHA) mission is to build stronger health systems through the design and implementation of data-driven solutions that respond to local needs and provide underserved communities with the tools to lead healthier lives. Based in Nigeria, eHA establishes new standards in health delivery and emergency response through the integration of information, technology, and logistics. eHA believes that stronger systems are best achieved through systems-level, integrated approaches.

Clinical lab malarial microscopy processes need to be efficient to deliver faster results such as moving slide inserts and image processing. Supporting results from malarial microscopy analysis, rapid diagnostic testing (RDT) is done which requires separate equipment for different parameters. Each of these pieces of equipment may have a different diagnosis time. As shown in the video, the urinalysis strip is the only one read on a machine. Other RDTs; (malaria, Strep Ag, COVID IgG, and IgM etc.) are viewed and interpreted by lab technicians. Typically, there are about 5 machines (Microscope, hematology analyzer, chemistry analyzer, urinalysis machine, Glucometer) that are used simultaneously.

The eHA clinic mainly caters to patients who are from urban settings and can access their lab reports in person. However, patients living in rural areas in Nigeria get their results in paper format.

Potential of Recycled Plastics and Recycle Right

Location: Ghana

Stakeholder: Makafui Awuku and Adwoa Coleman



Sorting waste is not a norm in African countries such as Ghana, Nigeria, and South Africa. Often, recycling centers are not located in proximity to communities where waste is generated. Usually, waste pickers collect plastic materials and drop these off at the waste aggregator stations. Collectors know the value of reclaiming products such as used plastic PET bottles. These collectors help to divert tonnes of plastic items from landfill every year. Adwoa highlighted that there is a need to better manage waste at the point of collection through sorting, separation to ensure the quality and integrity of the waste material is not diminished so it can be recycled. She also added that sorting systems is an issue across several countries in the African continent.

Waste that can be recycled and upcycled needs to be segregated when it is disposed. Makafui believes that a plastics circular economy is a prosperous economy that recirculates materials, keeping plastics out of the environment and in the economy. His social enterprise, Mckingtorch Africa, transforms plastic waste into useful products such as food ware, plastic mats, makeshift beds for the homeless, and decorative tress among other things. In addition, to promote and advocate plastic recycling, Makafui uses plastic waste to create art installations to create public awareness.

Mckingtorch Africa has installed waste segregation bins that are used by corporate enterprises, churches, schools to recover plastic waste instead of ending in landfills. The recovered plastic is processed for production or sold as raw materials to companies. As a way forward, Makafui is

trying to understand new forms of producing receptacles that can promote plastic recycling as well as ensure collection of plastic materials that retains quality for creating new products. He is planning to purchase a waste recover truck.

Makafui is constantly looking for ways to re-use plastic to create new forms of building materials. He is interested in recovering plastic waste which is wasted in large amounts that either get burnt or thrown away. After recovering the plastic, he hopes to create wood-like panels, bricks, and beams for construction. He is interested in understanding the process and equipment that would be required to make such construction materials. These fabricated materials need to have a competitive price as compared to the usual building materials used in construction.

Makafui envisions machine operators will be employed to run the fabrication process. He foresees that he would need a shredding, extruding, and sheet pressing like mechanisms to create the new products. He would like to understand if there are other integrated ways to produce such products in a limited space.

Safe Water for All

Location: Sana'a, Yemen

Provider(s): Mona Mohammed



For years already the poorest country in the Middle East and North Africa (MENA), Yemen now suffers from worst humanitarian crisis in the world. Embroiled in conflict since early 2015, fighting has devastated its economy—leading to serious food insecurity—and destroyed critical infrastructure. The UN has estimated that 24.3 million people in 2021 were “at risk” of hunger and disease, of whom roughly 14.4 million were in acute need of assistance. On top of this, some 20.5 million Yemenis are without safe water and sanitation and a staggering 16.2 million people require urgent emergency assistance because of food insecurity and malnutrition. As a result, Yemen has been grappling in recent years with mass outbreaks of preventable diseases, such as cholera, diphtheria, measles, and Dengue Fever.

Waves of currency depreciations in 2018 and 2019 have created lasting inflationary pressure on the Yemeni rial that has exacerbated the humanitarian crisis. The disruption of infrastructure and financial services has severely affected private sector activity. The more than 40% of Yemeni households that find it difficult to buy even the minimum amount of food may have also lost their primary source of income. Poverty is worsening: whereas before the crisis it affected almost half Yemen’s total population of about 29 million, now it affects an estimated three-quarters of it—71% to 78% of Yemenis. Women are more severely affected than men.

Since 2015, access to improved water sources has reduced by half. Before the current conflict, 50% of urban residents and 40% of rural residents had access to a public water network. Now, water supply is mostly informal, resulting in increased risk from poor water quality, and the overpricing of water which disadvantages the poor. Other factors that have resulted in reduced levels of service include displacement, which has led to overcrowding and increased pressure on existing facilities, and the economic crisis, which has led to fuel shortages and reduced water availability from water points that depend on fuel/generator pumping. Additionally, the loss in livelihoods has resulted in reduced buying power and a reduction in the ability of conflict-affected Yemenis to pay water fees and monthly bills.

Groundwater sources are under stress, since the institutions that were previously responsible for their monitoring have collapsed as a result of the conflict. Mona, our context provider has indicated that there is a need to monitor water-levels in the wells, its quality through inspection and chlorination. In particular, the current funded project requires design aspects that include information about the water source – such as the water source type (well, spring, etc.); water source quantity; water quality (pH, turbidity, coliform colony count, etc.); ownership (i.e. public or private); expected usage (i.e. domestic, agricultural); proximity to sanitation structures; and distance from the beneficiaries. Information about the community includes the number of reported cases of water borne diseases; whether or not the community was affected by the war; number of beneficiary families and individuals segregated by age and gender; difficulties in access to the water; and whether or not the community is being targeted by other sectors within the project.

Say Cheese

Location: Chiang Mai, Thailand

Provider(s): Piyanut Jingjit and Busakorn Janmai



In a small village in Northern Thailand, several people make a living through producing specialty food. Busakorn Janmai, makes cheese at her home through basic cheese making techniques. She makes specialty cheeses such as halloumi and paneer. Apart from making the cheese from scratch and selling it to restaurants, she used to grill and sell them at a market in Chiang Mai but because of the pandemic, the market was closed. Sometimes, she has customers who buy her cheese in bulk to resell in Bangkok. However, the demand is not regular. Some restaurants in Bangkok are her long-time customers but her cheese is not a significant ingredient in their menu, hence she does not receive bulk orders from them. She cannot sell at supermarkets because her cheese is not certified by FDA (Food and Drugs Administration). To get certified, she would have to invest significantly and rent a working space.

In terms of her process, an issue is cutting milk curd into smaller pieces. Currently, she uses a kitchen spatula to cut through the curd making it difficult to cut into smaller or regular sizes. She will cut the curd once every hour and let it rest before she repeats the process. She estimates the density of the curd after compressing the curd and relies on years of experience to get it right. Also, when compressing the curd into a rectangle loaf, she uses a stainless mold and a wooden block top. She uses a water tank on the wooden block as a weight to press the curd. The size of the loaf is not standardized which doesn't allow her to sell by weight. Piyanut, our

local context provider, has seen the cheesemaking process and said that the cheesemaker was using basic tools.

Busakorn, the cheesemaker, runs the business by herself and can't cope with sudden changes in demand for the cheese. Recently, she gained public recognition on a local TV documentary and now she must deal with sudden burst of orders – sometimes working late into the night. The surge of the demand is from local middle-class families and their relatives in Bangkok. They will visit the local farm for a meal and buy her cheese. Piyanut thinks this demand is related to local holidays when Thai people will go back to their hometown and celebrate with their families. Lastly, as the quality of the product degrades with time, the cheesemaker would be interested to optimize the process to take advantage of the demand as well as deliver high-quality cheese.

Smell the Patchouli

Location: Sulawesi, Indonesia

Provider(s): Ambika Putri, Anggoro Wicaksono, and Elisa Kusno

Patchouli plant (*Pogostemon cablin* Benth) is one of the essential oil-producing plants known as patchouli oil ("patchouly oil"). Patchouli oil is widely used in cosmetics, perfume, soap, and other industries. With the development of aromatherapy treatment, patchouli oil is beneficial for physical healing and mentally and emotionally. Indonesia is the largest supplier of patchouli oil in the world market, with a contribution of 70%. Patchouli oil exports in 2004 amounted to 2,074 tons with a value of US \$ 27.13 million (Directorate General of Plantations, 2006). The product produced from patchouli farming is tera (leaves and twigs). Through the distillation process, patchouli oil is produced. In the refining process, waste is produced as oil-refinement dregs. These dregs can be used as mulch to return to the land to its original condition (virgin soil).

In the village of Kendari, the entire community's livelihood is through cultivation of patchouli plants and distilling the harvest for the aromatic oil. The entire family is usually involved in the cultivation process that happens on their land. Our local context providers are hoping to improve the cultivation, distillery and waste management processes for better yield – leading to higher income for the families in Kendari, Sulawesi. The context providers reported that the low productivity and quality of oil occurs in the community. This lower quality can be partly due to the quality of plant genetics, simple cultivation technology, the development of various diseases, and improper harvest and post-harvest techniques. Lower quality of patchouli oil is often associated with traditional farmers who have not upgraded their farming methods.

The cultivation process happens in the following steps:

- Propagation: Patchouli is vegetatively propagated. The nursery is raised in the shade by planting 10-12 cm. Long cuttings are made with dimensions 10 X 10 cm. The seedbeds are kept continuously moist. They are ready for planting in the field in the next six to eight weeks at 60 x 60 or 60 X 90 cm spacing.
- Land preparation: The land is prepared for good tilth by ploughing, harrowing, and planting. The ridge should be 20-25 cm high and 18-22 cm broad with a spacing of 60 cm between the rows.
- Method of Planting: Rooted cuttings are transplanted generally in the evening in the field. Usually, the planting is done at 60 x 60 cm apart and around 28,000 rooted plants are required per hectare.
- Irrigation: Irrigation schedule is modified depending on the water holding capacity of the soil and weather conditions.
- Harvesting: The first harvest is carried out at the 5th or 6th month, and the second and third harvest every three months. From 875 saplings it is estimated that 262.5 kg of patchouli plant can be produced. The estimated selling price is Indonesian Rp 5,000/kg.

The context providers are actively involved in helping the communities in Sulawesi, Indonesia. They are looking into efficient harvesting strategies to produce more Patchouli. In the process, they would want to help the workers to distillate Patchouli oil for maximum throughput. Lastly, they are working with the farmers and workers to reuse the waste after the distilling process.

The Bamboo Weavers

Location: Lamphun, Thailand

Stakeholders: Piyanut Jingjit

In Northern Thailand, there is an abundance of bamboo clumps throughout the area. Often elderly women in villages collect bamboo, slice them in thin strips and weave a bamboo braid for a source of income. Bamboo-weaving wisdom has existed in the Thai culture since ancient times that are often used in crafting handicrafts and wickerwork products. As bamboo is available through all seasons, weaving takes place across the whole year.

In this opportunity statement, the villagers situated in Lamphun, weave bamboo braids that is each sold for about 10 Thai Baht (CAD\$ 0.40). The braids are often bought by hat makers. Each hat is not expensive and used by farmers. Hence, Piyanut is exploring to create more valuable products such as mats which would require the elderly women to weave more bamboo braids. Almost every village in Thailand has a homestay or resort and other products such as mats can be used and sold there.

As for the process, elderly women suffer from back problems because during weaving they sit for long periods in a day. As shown in the video, the elderly lady collects the bamboo then produces thin strips by herself using a sharp knife. She has been doing this for 30 years, however, the price for bamboo braids have not increased much.

Piyanut is seeking solutions to make bamboo weaving efficient and create a lucrative income source for elderly folks that do not have detrimental physical effects on them.

The Wandering Sheep

Location: Mthatha, South Africa

Stakeholder: Alex Kizito



Most community members in the rural town of Rosedale, Mthatha in Eastern South Africa, have animals such as sheep and goats. The breed of the sheep that is found in the region is known as Dorper. The owners of the livestock nurture them for their wool and meat. It is also a cultural norm to have animals in this community. These members hire shepherds, usually young men, to take their animals for grazing in the vicinity. As these green pastures are communal and limited, several shepherds end up grazing their animals in the same location. Often when the shepherds arrive back to their respective homestead, they realize some goats or sheep are missing.

Although the other livestock owners live within a 5 km radius, it is a tedious task to go looking for the lost animals in others' homesteads as community members do not have cars. In some instances, the animals do not get mixed up with others' livestock but wanders off in a different direction or falls in a ditch. Owners have tried labeling their livestock with spray paint and attached ear tags but often the labeling looks similar. Also, it is not a common practice to have collars and bells around the necks of the animals. An animal owner may have 120 – 150 sheep and some goats.

Typical when animals go missing, the shepherd reports to the owner and search around the vicinity of the homestead and forests. In many cases when animals lose their herd they are attacked by stray dogs. Alex noticed that often animals leave their herd to give birth and later found with their offspring.

The relationship between the owners and the shepherds is precarious, mainly due to being underpaid, as they have a reputation of not turning up at work without notice. There have been

instances when the shepherds had fled while the animals were still grazing in the fields. In terms of connectivity, shepherds have access to cell phones to make calls. On the other hand, livestock owners have internet connectivity on their mobile devices. The owners and shepherds speak a common language.

The livestock owners would benefit from a cost-effective solution to track their animals and find them when lost.