AproTech Ghana

Empowering Ghana's rural poor

AproTech Ghana is an organisation dedicated to fostering sustainable and equitable development in Ghana and across Africa, by showing the development community that if we give Africa's rural poor the right tools to make use of the resources around them, they can work their way out of poverty

Contents

Introduction

At first glance, there's nothing extraordinary about the shed sitting next to Uncle Joe's mud brick home in the coastal Ghanaian village of Atabadze. Inside, there's a certain familiarity about the clutter – tools propped up against stacks of roofing sheets and machinery – the kind of organized chaos you'd find in tool sheds and workshops anywhere in the world. But the sheer ordinariness of it of all belies the fact that this is the birthplace of a remarkable and important technology. Those roofing sheets – Uncle Joe made them, out of local river sand, using only his own ingenuity and the electric vibrating table in the corner – he made that too.

Uncle Joe is an innovator. He has brought his community something they never had before: a roofing material that is both sturdy and affordable. Before his intervention, his neighbours had a hugely unsatisfactory choice between using expensive, often imported, manufactured materials, or local unprocessed thatch, at a fraction of the price, but at the cost of durability; there was no middle ground. But Uncle Joe was not so sure this was necessarily a matter of 'either or'; why couldn't there be an alternative that was both manufactured and local, he wondered.

> The poor need opportunities to generate income and work themselves out of poverty

So he set about answering his own question, experimenting with local environmental inputs and different manufacturing processes. And through his efforts he developed a process to produce roofing sheets from river sand – a sturdy, high quality product manufactured from a sustainable local resource. To produce these sheets, Uncle Joe even had to build his own electric vibrating table, a vital piece of machinery that blends the sand with a small quantity of cement (added as fixative), enabling the mixture to set. All in all, an unlikely triumph of innovation considering the poor infrastructure and extremely limited availability of capital and manufacturing know-how in his rural locality.

Uncle Joe is a prime example of the creativity and dynamism that are blossoming in Africa; one of the many individuals and communities championing innovative technologies that, by mobilising local resources to provide essential goods and services, and create income generation opportunities for the poor, can deliver sustainable and equitable 'grassroots' development across the continent. And yet his story also illustrates the uphill task they face.

For all the originality of his idea and his dedication to implementing it, Uncle Joe cannot currently make ends meet manufacturing tiles – he simply cannot afford to hire the labour he needs to produce viable volumes. Without capital, his operation will not reach a level at which the technology can really impact the lives of the poor.

For the global development community (donors, NGOs, etc) Uncle Joe's story is one of opportunity: it highlights an opportunity for them to create the opportunities the rural poor need to work their way out of poverty. To date the governmental and multilateral institutions with the resources and clout to change the lives of those living in poverty have favoured a

development agenda focused on large-scale infrastructure investments: dams, highways roads, clinics and schools. And while these may foster development on paper, do they really reduce poverty by themselves?

The clinic may treat the maladies of the poor, but will it do more than just help them survive in poverty? And the school may afford the children of the poor untold opportunities down the line, but in the here and now the parents still have to find money to pay for it. To benefit from this infrastructure, the poor need opportunities to generate income and work themselves out of poverty, and infrastructure alone won't create those opportunities.

enhance the capacity of the Centre to fulfill its aim of reducing poverty in rural Ghana, we have created AproTech Ghana, a charitable organisation in the UK, to coordinate funding, technical assistance and advocacy support for the Centre's activities.

In this prospectus we will outline Dr Sam's vision of a new model of development for Africa, one that is both sustainable and equitable, and discuss the project though which we propose to bring this model to the attention of actors that can implement it on a meaningful scale. We call it the Technology Village – a real-life, practical study of how appropriate technology can impact the lives of a poor community in rural Ghana.

Left: Uncle Joe operating his vibrating table

Right: The finished river sand roofing sheets, ready for installation

To make meaningful inroads into poverty reduction in Africa, the development community must foster the growth of robust local industries that mobilise the continent's substantial environmental resources to meet local needs and create opportunities. Technologies like Uncle Joe's manufacturing process are the foundation on which such industries are built, and donors should support their development, whether by investing in the entrepreneurs pushing innovative local solutions or by providing the tools and training rural communities can use to unlock the developmental potential in their local environment.

This is the development philosophy espoused by the Appropriate Technology Centre of Cape Coast, Ghana and its founder, Dr Kofi Sam. To

We thank you for both your consideration of our ideas and for any support you may feel compelled to give to our project.

The Problem

Bananas and Honey

"Africa is like the man who goes hungry with a banana tree growing his back yard… The African intellectual is like a bee who has forgotten how to make honey." Even folksy wisdom and evocative language can't mask the fact that Dr. Kofi Sam, a self-styled misfit in the Ghanaian elite, pulls no punches when talking about Africa and development. Harsh words maybe, but it seems that for a staunch advocate of an African solution to the continents' woes, promoting an outspoken brand of African self-awareness is part of the process.

Be wary of letting his rhetoric fool you, mind – Dr Sam is infinitely more substance than similes. He is a man who has witnessed the post-independence evolution of his West-African homeland from a variety of angles – professor, industrialist, politician, and citizen – and has distilled this cumulative experience into a compelling perspective on where Africa is going wrong and how it can right itself.

So how much do bananas and honey really have to do with Africa's development? Well, in as far as they are natural resources, more than you might think. For Dr. Sam, resources are at the heart of the matter; and Africa has a lot of them. Tropical Africa has in its back yard one of the biggest proverbial banana trees of all – an enviable natural abundance of not just the commodities and cash crops the outside world covets, but also the less sexy, simple environmental resources that its people need to survive – foodstuffs to sustain their families, raw materials they can use to make clothes and build their homes, natural medicines to heal their illnesses. And yet, across the continent, people live in poverty, struggling for basic necessities in spite of this abundance – going hungry with a banana tree in their back garden.

When responding to international demand for its commodities, African economies have always moved energetically and effectively. Sadly, the same cannot be said for their efforts to mobilise local resources to provide for their own people's basic needs. This has a lot to do with who is doing the moving.

The traditional power brokers in African economies since decolonization have been the educated elites – the movers and shakers in politics and the private sector. And the stark reality of modern Africa is that this sect lives in a different world from the everyday African man and woman: a cosmopolitan realm shaped by

Western customs and comforts. A domain of suits and neckties in the tropical heat, air-conditioned offices, German saloons and American 4x4s, that insulates its inhabitants from the Africa outside. For Dr. Sam, this domain is an unfortunate by-product of the 'tunnel' of Western education, which has proved a popular thoroughfare for Africa's elite – "when you enter it," he says, "you learn how to forget the village," and many among them have done just that.

Just as a bee gathers nectar from nearby plants and uses it to make the honey that will sustain the colony in colder months, for centuries, African villagers have fed themselves, clothed themselves and sheltered themselves using the resources around them. But in the modern African state, the power brokers of the economy, for whom the Western way is the gold standard, are too detached from the village paradigm to see that Africa has the resources to provide the essentials for itself. Rather than building local industries that mobilise local environmental resources to meet the needs of the African people, the African elites have generally preferred to build their personal fortunes by supplying the domestic market with imported goods that Africa could provide for itself – like bees that have forgotten how to make honey.

> Africa has the resources its people need to survive; yet, across the continent, people live in poverty

A second AIDS crisis

In importing the food, clothing, medicines and building materials that they could produce themselves, many African states are missing out a key growth opportunity. The creation of local industries that use local resources to satisfy local demand for these goods can create jobs and opportunities, attract investment and promote a more even balance of trade – key ingredients of sustainable development. The failure to develop

The Man

Aprotech Ghana is built around the vision and life's work of **Dr Kofi Sam**, a man with a lucid understanding of the obstacles faced by his and other African nations and a philosophy he believes can help these countries to overcome them.

Dr Sam, a high-school classmate of namesake Kofi Annan, is an engineer with Ghanaian and English training. A cursory glance over his CV would suggest he is someone well acquainted with the way things work in his country. He has held coveted positions in education – as a professor at the Nkrumah University of Science and Technology (UST), in the private sector – as the general manager of Tema Steelworks, one of Ghana's largest indigenous corporations, and in government - as Minister for Works and Housing. Now in his 70s he is working full time to implement a vision for sustainable development in Ghana and beyond, a vision that has occupied his mind since his youth: the promotion of Appropriate Technology – productive technologies that are appropriate to the local environment – in Ghana.

Growing up in Ghana's central region, Dr Sam's learned to meet his basic needs from the environment around him through traditional methods: farming, fishing, and harvesting Neem for charcoal and herbs for medicine. This was the norm in the village. As a graduate student in the UK he was struck by the role of the environment in shaping the technologies he was learning about – an idea that spoke to his experience growing up. "We learned about how the refrigerator originated from the ancient Britons' discovery that if they left meat in the snow, it wouldn't rot," he says, "Technology is all environmental!"

Returning to Ghana to teach at UST), he was frustrated to find that the curriculum lacked relevance to the local geography; traditional Ghanaian methods of production, sustainable specifically because they had evolved in response to the local environment, were no longer being taught. Finding it ideologically impossible to continue teaching there, Dr Sam moved on, taking away a valuable understanding of the development challenges facing Ghana from the experience.

He spent the better part of the next decade in industry, ultimately running Ghana's steelworks, until an unfortunate incident radically changed his course. "I was in an accident," he says, "and suffered whiplash." It was never properly treated and he was later diagnosed with a fused vertebrae. Unable to even sign his own signature, he was forced to resign from his post. His treatment options seemed bleak; surgery carried with it a high risk of paralysis and his condition was not responding to medication. Seeing the state he was in, his sister asked him to consider seeing a traditional herbalist near Cape Coast, where she lived, who had treated her previously. In usual circumstances, suggesting herbal treatment to a captain of industry in Ghana – someone with unfettered access to Western medicine – would just be wasting breath, but Dr Sam was frustrated and desperate, and so agreed to see her.

The herbalist, an elderly woman, made a concoction from herbs she had planted, applied it to Dr Sam's neck and instructed him to leave it on for a number of hours. "I still remember the experience," he says "an hour into the journey back to Accra, the concoction turned really hot, like I had a burner on my neck! But it was similar to the heat treatment at the hospital, so I braved it." Back at his home that evening, Dr Sam slept for more than four hours for the first time in eight months. And with that, he was converted; he upped sticks and moved to Cape Coast to continue with the treatment. And it was working.

He was awed by the experience: "I couldn't believe an African has a cure to this;" he says, "this old lady who doesn't know anything about sodium chloride or Newtons was helping me to get better in three months!" He saw the potential of Africa's environmental technologies as clear as ever, and a purpose crystallised in his mind: "I made a compact. I said: my God wherever you are, if I'm able to sign my signature again, I will forget about Accra, or Britain, and I will promote African technologies for the rest of my life."

Honouring this resolution, he stayed in Cape Coast and in 1980 established the Appropriate Technology Center, an organisation dedicated to developing technologies for the provision of food, housing, clothing and medicine, based around local resources and knowledge. His work was recognised by the then President, Jerry John Rawlings, who invited him to serve as Minister for Works and Housing. But government proved not to be a suitable platform for Dr Sam to implement his ideas – bureaucracy and entrenched interests perpetually frustrated his work – and he left to resume his work in the non-governmental sphere.

Today Dr Sam's organisation continues to work at grassroots level to improve the lives of rural people in Ghana's Central Region, offering skills training to the unemployed, advocating the appropriate technology cause and promoting the work of local entrepreneurs. This work is all part of his broader vision: to foster the development of a sustainable economic model in Africa by promoting the use of appropriate technology in Ghana and across the continent. The objective of this organisation is to help him realise that goal.

A second AIDS crisis (cont.)

viable import-substitution industries leaves many African economies mired in a state of aid dependency. "It's a worry to the economy, because we can't balance our books," says Dr Sam, "therefore the donor countries, [the International Monetary Fund] and the World Bank end up balancing them for us with budgetary support. It's a problem."

Regrettably, there may be no quick fix to the problem, because the long-running trend of unnecessarily importing essential goods has engendered a systemic, even cultural, crisis across Africa that Dr. Sam has come to call a second-form of AIDS – Acquired *Import Dependency* Syndrome. In his native Ghana, Dr. Sam sees manifestations of this crisis in all spheres of life: more and more houses are being built with Scandinavian concrete, more workmen are using machinery for which they can't source spare parts and rice is becoming increasingly popular vis-à-vis homegrown staples like cassava and yam. "We are descended from ancestors who knew how to produce," he says, "but today everything is imported – people think there is nothing here."

"We are descended from ancestors who knew how to produce, but today everything is imported"

In one sense, import dependency is in the mind – owing to the practices of the elite, who mould the aspirations of their broader society, imported goods have become 'aspirational' in contemporary African cultures, a development which has negatively impacted perceptions of local products. In another sense it is quite real, because viable import-substitutes are not being produced, even though the resources are there.

This paucity of local alternatives is the result of a kind of internal 'brain-drain' taking place in African economies – the individuals with the capital, skills and clout to make import-substitution industries work are often snapped up by the public sector and well-established corporations, where the promise of income security is a pretty significant carrot. The governmental system in Africa, Dr Sam says, only caters to public sector workers and the upper echelons of society (or both): "from the president down to the teacher, they all get paid at the end of the month." By contrast, the road to establishing an independent import-substitution venture is a lonely one; the lack of a clear government framework backing such pursuits leaves would-be entrepreneurs under-equipped to combat the powerful interests of importers and their foreign counterparts. With such lop-sided incentives, it's no wonder so few take up the mantle of import-substitution.

And instead of offering hope, the university system in Africa, a key thrust of the development agenda in many low-income countries, is perpetuating this internal 'brain-drain'. University teaching is increasingly being shaped by the gravitational pull of the public sector – it has become more theoretical, less practical, reflecting the reality that agriculture students now aspire to become regional supervisors on the state payroll, rather than dynamic agriculturalists looking to solve food production problems. "There is a complete break between what we do and what we learn," Dr Sam says, "the education system has nothing to do with Ghanaian production."

As long as the systemic conditions that perpetuate import dependency persist, the developmental potential of Africa's environment will remain unrealised and the continent will not be able to grow on a sustainable footing. African economies need a new hypothesis – one of self-reliance.

Real Development

In the previous section we considered the big picture, and asked what import dependency has meant for African economies and sustainable development. And while it's valuable to keep sight of the big picture, it is also important to recall that economies are driven by the actions of citizens and development is about more than nurturing a country's per capita GDP figure – it's about people.

African economies are growing – steadily and seemingly in spite of their reliance on imports. But for the majority of Africans, who live in poor, rural areas, this doesn't mean much, because they are on the sidelines of urban-focused economies geared towards those sending raw materials out and bringing manufactured goods in – an economic system that doesn't work for them.

Real Development (cont.)

"They get up in the morning, go to their farms, and produce their cassava or yam or plantain," says Dr. Sam. "Nobody guarantees them a market. Nobody gives them loans. The villagers don't get anything." Therefore any 'development' (that may be inferred from a rise in per capita GDP) these economies may achieve, has no real impact on the lives of the rural poor.

For the rural poor development means opportunity – the opportunity to generate income, provide for their own basic needs, and improve their circumstances – an opportunity they currently lack in a system that marginalises indigenous production. To bring the rural poor into the fold, Africa needs to follow a new economic philosophy, one of using its considerable environmental resources to meet the needs of its people, to which the productive practices traditionally pursued by villagers (agriculture, carpentry, weaving etc.) are integral, as a basis for robust domestic industry. Only then will the poor be afforded the mobility – "the ability to decide, design and implement their own needs," as Dr Sam defines it – that necessarily constitutes development.

> The rural poor lack opportunity in a system that marginalises indigenous production

Economic growth in Africa doesn't have to be a zero sum game; there is no golden rule that for those at helm to prosper, those below must go hungry. The interests of the stewards of the continent's economies and those of its rural poor are more closely aligned than it may seem. African economies need to grow sustainably and autonomously and Africa's rural poor need opportunities to improve their livelihoods. These needs have the same solution: an Africa that provides the essential for itself. Getting there starts with fostering an appreciation of the developmental potential of Africa's environment, and how to harness it effectively, first among the people, and, in time, the state. This is Dr. Sam's vision.

02 The Solution

Go Back and Take

In modern Ghanaian society, traditional symbols are a key feature of daily life. They're found on clothes, in architectural design, even in commercial marketing. These are Adinkra symbols, visual maxims by which the Akan people, ancestors of many modern Ghanaians, transmitted cultural wisdom. Among the most prominent of these Adinkra symbols is *Sankofa*, often depicted as a bird craning its neck backwards to pick an egg off its back. In the Akan language, *sankofa* means to "go back and take"; The symbol conveys the importance of learning from the past. Nowhere is this message more applicable today than in the context of development, where the experience of the forebears of modern African societies holds the key to current challenges.

The ancestors of modern Ghanaians and their African neighbours quite literally lived off the land – they fed themselves, sheltered themselves and clothed themselves using local resources and their acquired understanding of the practices their environment could support. And in doing so, they lived not only sustainably, but also, relative to many of their descendants, they lived comfortably – they were able to provide for their basic needs. But in an era characterised by the information revolution and increasing awareness of the world outside our own borders, many African communities are looking to the outside to define the way they live, and the connection with the environment that ordered the lives of their ancestors has all but evaporated.

Africa's widespread poverty is a testament to the fact that following outside models will not lead to equitable and sustainable development. Reassuringly for the continent, however, there is another way: as the renowned political scientist Samuel P Huntington observed, Modernisation is not the same as Westernisation. Africans needn't look to the West to set their course, but rather should heed the example of their ancestors by developing their own model for living based on the idiosyncrasies of their own environment and how its resources can best be mobilised to support sustainable economic growth and development.

Dr. Sam believes that with the dynamism of the African people and communities, there is no question that a successful model of African self-sufficiency is attainable. But, he concedes, they're going to need assistance, in the form of tools and training in practices that are compatible with the geographical conditions they live in, to empower them to sustainably harness the potential of their environment. This is the key thrust of Dr. Sam's vision: to foster the development of a sustainable economic model in Africa by promoting the use of appropriate technology in Ghana and across the continent.

What is appropriate technology?

Technology, broadly speaking, can be defined as the tools we use in generating income and meeting our basic human needs – these can include physical equipment and machinery as well as practices and skills. A technology is 'appropriate' where it is a suitable tool for the task at hand. Suitability is inherently a matter of context – what is the task, what are the circumstances under which it is being performed – and a large part of context is geography – the nature of a task can change dramatically from one location to another.

By that definition, an appropriate technology could be anything, really. But appropriate technologies the world over do have a common denominator: they are tailored to the unique geographical conditions of the specific environment in which they are used. They are, in a word: '**local**'. They mobilise local assets –natural resources, labour and knowledge - and mitigate local constraints to production – low capital stocks, poor infrastructure, unavailability of inputs – empowering local people to generate income or meet their basic needs effectively and sustainably.

You may think that in the context of rural Africa, appropriate technology is synonymous with primitive technology, but this is not necessarily the case. What, for example, does Dr Sam consider to be the appropriate technology that has had the greatest impact in rural Africa? His answer might surprise you – it's the mobile phone.

Mobile phones are appropriate technology for rural Africa because firstly, the relatively small infrastructure requirements of a mobile network are realistic for Africa, and secondly, the phone service has been adapted to be affordable to the rural poor and compatible with local economies – customers anywhere on the continent can buy 'credit' in tiny denominations from local village traders.

The mobile phone is transforming African commerce by removing inefficiency – taking the physical travel out of many business transactions – and helping businesses deliver vital services (such as mobile banking) to previously unreachable customer markets.

As this illustrates, the definition of appropriate technology that we follow encompasses any technology that is compatible with the geographic conditions of the location where it is practiced and can empower the people who use it to improve their own circumstances.

Appropriate technologies empower local people to generate income or meet their basic needs effectively and sustainably

What are the benefits?

In geographies like rural Ghana where significant environmental and human resource endowments have not translated into viable local production, the right tools can help the local people draw on the untapped developmental potential of their environment, for not only their own benefit, but also that of the broader economy and the environment.

Consider, for instance, compressed earth brick making – an appropriate technology that has been adapted for many developing regions to produce a sustainable source of affordable, high-quality building materials for local consumption. Using a hydraulic press, local craftsmen can create bricks using laterite (a type of reddish soil occurring naturally and abundantly in tropical Africa) and small quantities of cement and plaster (to enhance their durability). These bricks are significantly more resilient to the elements than unprocessed building materials such as mud and straw, and significantly more affordable than imported building materials, yet of comparable durability in tropical conditions.

The benefits of introducing such a technology into rural areas are wide ranging. For the people, it can deliver an affordable, yet high-quality means of meeting a basic need (housing) and create income generation opportunities, both in brick-making and associated services (e.g. construction, distribution, technical maintenance). For the broader economy, the technology can serve as the keystone of a robust domestic industry capable of meeting domestic needs, reducing the country's expenditure on imports and fostering sustainable development. And for the environment, it promises relief from the unsustainable practice of needless importing, ensuring that environmental impact is minimised through the use of local production to meet local needs.

At this stage, the benefits of appropriate technology and how they can be achieved may all seem overly conceptual. We will now consider the framework by which Dr Sam intends to promote appropriate technology and realise these benefits in Ghana.

The 'Technology Village': a clinical trial

The ultimate goal of promoting appropriate technology in Ghana is to catalyse the growth of viable and sustainable industries using local resources to provide affordable goods to the domestic market. This, of course, is a long-term

ambition – industries don't just spring up overnight. In the long run, realising this goal will require the nurturing of a market for local goods, investment in factors of production and the supporting infrastructure, and a policy framework that is conducive to industrial growth, but, for Dr. Sam, it all starts with capturing the imagination of the potential stakeholders.

Who are these potential stakeholders? First and foremost there are the local entrepreneurs, whose endeavour and innovation is the driving force behind local industry development. And then there are the supporting actors, who we'll call 'the development community': the governmental institutions, NGOs and university departments, in Africa and abroad, that profess an interest in the continent's development – the actors who can mobilise the necessary resources and clout to realise the developmental potential of promising initiatives. For appropriate technology to catch on in local economies in Ghana and across Africa, all these players (entrepreneurs and the development community) will need to be meaningfully involved. So how do you get them onside?

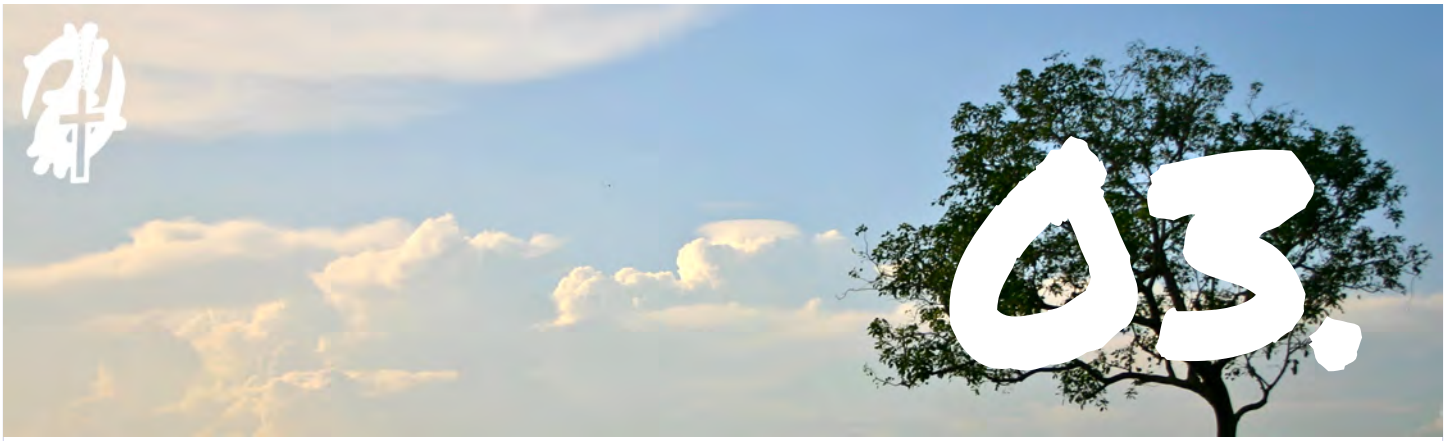
Fortunately, the class of local entrepreneurs and the broader development community can be incentivised to take up the appropriate technology cause in the same way: by showing them that it works. For an entrepreneur to be willing to pursue an appropriate technology venture, he or she needs to be confident that taking that the risk will prove profitable. Equally, for the development community to get behind appropriate technology as a poverty reduction strategy, they need to see evidence of its potential for achieving that effect.

This is familiar territory for Dr Sam – both his training as an engineer and his personal experience have taught him that to generate mainstream acceptance for a new idea you need to be able to prove its merits; pure advocacy can only go so far. "I've talked about [appropriate technology], preached about it, been a government minister because of it, and it doesn't go anywhere," he says. Nowadays he has shifted his focus from raising awareness to considering the question "what can we do in our lifetime that is measurable?"

To that end, Dr Sam's vision (and the object of this organisation's appeal for funding) is to create a model to demonstrate the developmental impact of appropriate technology in Ghana to the potential stakeholders. By way of analogy, let's say appropriate technology is a new drug with the potential to cure Africa's developmental infirmities; in that context, what Dr Sam is proposing is a clinical trial. In the medical industry, this is common practice, and it is effective – it gives investors the necessary confidence in the efficacy of the drug to back it. Why shouldn't it be just as effective in taking out the guesswork for investors looking to scale development initiatives.

"Let's take a well defined community," he says, "and attempt to solve local problems (low development, underemployment etc.) with appropriate technology… developing the community in a specific way, to show how technology can impact on African society." He calls this model: a 'technology village'.

"What can we do in our lifetime that is measureable?"



The Technology Village

Summary

The Technology Village is the flagship project of Dr Sam's Appropriate Technology Centre. It will be a centre for the teaching and practice of locally appropriate methods of production based in the village of Aburansah, Central Region, Ghana.

The objects of the project are:

1. To train the local community in locally appropriate and sustainable productive practices through active participation in the production of marketable essential goods (food, building materials, clothing, medicine) for local consumption from local environmental resources using locally appropriate technology.

2. To create a model of community-based locally appropriate and sustainable production that can be replicated and scaled in rural areas across Africa.

What will it involve?

The key activity carried out by the centre will be the provision of practical training in locally appropriate methods of production (LAMPs) to the surrounding community.

LAMPs are productive practices that use locally appropriate technologies to mobilise local environmental resources, facilitating economic activity that is fruitful and sustainable in rural areas.

Poverty in rural areas of Ghana (and Africa, by and large) stems from a scarcity of economic opportunity – although they are surrounded by a vast endowment of natural resources, the rural poor generally lack appropriate tools and skills to tap this economic potential.

Skills

Under the state education system in Ghana, a child in a rural village studies the same curriculum as a child in Accra, the nation's capital. While this may go some way to creating a level playing field for access to lucrative opportunities in urban centres, the teaching imparted does not adequately provide students who remain in the village with the necessary practical skills to earn a sustainable living in a rural environment. Despite their education, these students are often not able to contribute to the local economy in any meaningful way.

To address this problem, the centre will disseminate training in economic activities that are relevant and appropriate to the local economy and local resources.

Such activities will include:

- **agricultural practices**, such as animal husbandry (e.g. poultry, snails, grasscutter and crab); crop production, processing and food preservation.
- **simple manufacturing techniques**, such as woodworking, metalworking, textile working and construction from local materials
- **renewable energy generation technologies**, such as solar power and biogas

Tools

At the centre we will provide training practical, 'hands' on training. Participants will learn about LAMPs by working with locally appropriate tools to produce marketable goods. Through this approach, we hope to acquaint the community with the benefits of using locally appropriate tools, and foster an appropriate technology mindset that catalyses the proliferation of existing appropriate tools and the development of new ones.

In rural African conditions, tools are appropriate where they mitigate local constraints (such as low capital stocks and poor infrastructure) and enable the rural poor to add meaningful value to materials through their labour. Such tools should be:

- affordable to acquire or use
- easily maintainable
- powered by sustainable local power sources (such as solar or biogas) or are manually operated (where appropriate)
- designed to process local materials effectively and efficiently
- designed to make labour productive

To facilitate practical training of the productive practices described above, we will invest in relevant locally appropriate technologies. Where a technology that is not fully appropriate under the criteria above cannot be sourced, we will seek to adapt a transplanted technology to make it locally appropriate.



How it will operate?

Participants will learn locally appropriate productive practices by actively participating in the sustainable production of marketable goods for local consumption using locally appropriate technologies to process local environmental resources.

The activities taught will be in the spheres of agricultural production, food processing, building material production, textile production and the harvesting and processing of medicinal herbs: activities that correlate to the basic human needs of the local community (food, shelter, clothing and medicine). These activities will be brought on-stream incrementally as the resources and capacity of the centre grow.

Income generated by the sale of goods will be used to sustain community activities and remunerate the residents for their labour, with a view to enhancing their ability to establish ventures that process local resources to provide goods for local consumption.

To the same end, the Centre will also work to adapt technologies to make them more affordable for the rural poor and/or suited to local conditions. Accordingly, the centre will host visiting

technologists who can offer expertise relevant to achieving this aim.

Over time, the impact of participation in these activities on the ability of residents to meet their basic needs (a fair indicator of development) will be measured, to generate data that can be used to evaluate the efficacy of this approach to poverty reduction.

What are our ambitions?

Locally	Nationally/Internationally
To foster the creation of local, sustainable economic opportunities that the rural poor need to work their way out of poverty, by: • giving local workers the skills to generate an income and meet their basic needs using the resources around them • building local awareness of the benefits of appropriate technology • enhancing the ability of the local community to invest in such technology, by: o providing them with income generation opportunities through the project o adapting technologies to make them more affordable for the rural poor	To promote an economic model of self-sufficiency in Ghana based on local industries mobilising local resources to meet local needs. To encourage the donor community to invest in access to locally appropriate tools and training for the rural poor, by providing them with evidence that this approach can reduce poverty.

What are the benefits?

Area	Problem	Our Solution
Poverty Reduction	Ghana's rural poor lack economic opportunities.	Providing the rural poor with the appropriate tools and skills to unlock the economic potential of their environment.
Sustainable Development	By importing essential goods rather than producing them domestically, Ghana is missing out a sustainable growth opportunity and perpetuating their reliance on foreign aid.	Fostering the development of local industries that produce goods from local resources for local consumption – this creates jobs; attract investment and keeps profits in the economy.
Equitable Development	An imbalance of opportunities between urban and rural areas leads to overcrowding in cities and unrest in marginalised areas.	Creating economic opportunities in rural areas to redress the imbalance.
Environmental Sustainability	The importation of goods that can be produced domestically is damaging to the environment.	Fostering the production of local goods for local consumption.

Project Implementation

Phase One

Commence **cooperative mechanised agricultural cultivation and planting activities** on project site (20 acre plot owned by the Appropriate Technology Centre, Aburansah, Central Region), with a view to:

- training participants in mechanised agriculture
- generating interest among local people (many of whom are subsistence farmers) in participating in the project
- producing inputs for processing activities (that will come on-stream later)

Phase Two

Once sufficient local participation in the project has been achieved, incrementally introduce **practical training in crop processing, animal rearing, building material production, textile production and medicinal herb processing.** Apply the profits from the sale of the products of these activities to:

- financing training activities and maintaining equipment
- remunerating participants, to enhance their ability to invest in locally appropriate equipment of their own/establish sustainable ventures

Construct the physical infrastructure of the site – dwellings for participants and visiting technologists –using primarily local, sustainable materials.

Measurement

Collection of data indicating the developmental impact of the project on participants, will start concurrently with the first phase of the project, to establish a basis for comparison with later figures.

Data will be collected on the participants' capacity to meet their basic human needs (food, housing, clothing, medicine), which we believe to be the most useful indicator of development.

From this point onwards, we will periodically measure the impact of the training activities on the livelihoods of participants.

After a period of 2-4 years from the establishment of the model, we expect to be able to provide the development community with sufficient evidence to judge the efficacy of the teaching locally appropriate methods of production as a poverty reduction and sustainable development strategy for Africa.

Index of Productive Practices

In the upcoming pages we will consider the productive practices (and associated technologies) that will be taught in the Technology Village. These can be categorised by sector (Housing; Food & Agriculture; Clothing; Medicine)

In this section, we will outline what the respective practices are, the benefits they aim to provide, how they function, the equipment needed to implement them and provisional costs involved.

Housing

Laterite brick production

Above: Model House constructed from laterite bricks – Cape Coast, Ghana

Above: Dr Sam with compressed laterite 'male-female' bricks

Laterite is a type of reddish soil rich in iron and aluminium occurring naturally and abundantly in tropical Africa. When mixed with a small quantity of cement, it can be used to make high quality, affordable bricks.

By fostering laterite brick production, we can provide an affordable and sustainable local alternative to imported building materials, creating income generation opportunities for the rural poor and obviating the environmental impact of importing such materials.

Aims: To train the participants to produce sustainably sourced bricks for local consumption; to produce bricks for the construction of dwellings for residents of the Technology Village and other buildings (which will also serve as models in the marketing of laterite bricks as an affordable local building material).

Process: The laterite soil is dug up and mixed with water and cement or another binder (around 8% by volume) in a pan mixer. The mixture is then manually pressed into bricks using a hydraulic press. The bricks are then cured with water until suitable for construction use.

Equipment Needs:

- Hydraulic press
- Materials for Pan Mixer (metal drums, mixing apparatus)
- Production tools (Pick axes; shovels; wheelbarrows etc.)
- Machinery Maintenance supplies

Tentative Project Cost:

Manual hydraulic brick press	US$ 4,000
Pan Mixer materials	US$ 500
Production Tools	US$ 1,000
Maintenance Supplies	US$ 2,000
Production Inputs (Concrete/Plaster)	US$ 5,000
Freight/Insurance/ Ground Transport[1]	US$ 2,000
Import Duties and Taxes[2]	US$ 200
Total	**US$ 14,700**

[1] Estimated figure for importation of Hydraulic Press (quote from Brazilian supplier)

[2] Based on Ghana Revenue Authority (GRA)'s Import Tariff Schedule, imported equipment mentioned above only attracts assorted fees aggregating to 3% of Cost, Insurance & Freight, not VAT/Import Duty

Sustainable roofing sheet production

The use of asbestos-cement (A-C) sheets as a roofing material is common in rural Ghana; this practice is not only economically unsustainable, but also poses serious health risks to local communities.

Using river sand or even coconut fibre, it is possible to produce a local alternative to A-C sheets, that is affordable, durable and presents no health risks. The production of these sheets also presents a promising income generation opportunity for the rural poor

Aims: To train the participants to produce sustainably sourced roofing sheets for local consumption; to produce roofing sheets from sustainable local materials (e.g. river sand/coconut fibre) for the Technology Village dwellings.

Process: River sand and/or fibre from coconuts that have fallen to the ground is mixed with cement or another binder (10%), placed in a mould, vibrated on a vibrating table and left to set.

Equipment Needs:

- Materials to construct vibrating tables (electric motor; springs; timber) (x2)
- Moulds (x2)

Above: Uncle Joe operating his vibrating table

Above: A moulded river sand sheet

Tentative Project Cost:

Vibrating Table Materials (x2)	US$ 500
Moulds (x2)	US$ 200
Production Inputs (Concrete)	US$ 2,000
Total	**US$ 2,700**

Sustainable timber processing

Above: Ghana's rainforests are being depleted

Above: Sofa frame made from local cane

Currently, Ghana's rainforest is being depleted at an alarming rate, due to illegal logging driven by demand for timber at home and abroad. Promoting the processing and use of timber from more sustainable sources to meet local housing and furniture needs can help stymie this trend.

Aims: To teach the cultivation and processing the fast-growing 'Neem' species of acacia through the production of timber for local consumption and for use in the construction and furnishing of Technology Village dwellings, and to reduce reliance on rainforest timber.

Process: Neem trees from plantations belonging to the Appropriate Technology Centre are felled by chainsaw and processed using stationary woodworking tools (hand-held power tools such as circular saws and planers can be adapted for this purpose by affixing them to table units created from local timber), while, concurrently, the plantations are replanted.

Equipment Needs:

- Gasoline-powered Chainsaw
- Stationary woodworking tools (adapted table saws, planers, routers etc.)

Tentative Project Cost:

Chainsaw	US$ 500
Stationary Woodworking Tools	US$ 1,500
Total	**US$ 2,000**

FOOD/AGRICULTURE

Mechanised Agricultural Production

Ghana is green. The climate is highly conducive to agriculture, with two rainy seasons a year, and the soils are fertile. But, by and large, agricultural production in Ghana is far from fulfilling its potential, and the country relies on imports to meet local demand for food.

This is largely due to the labour-intensiveness of current practices – farmers lack tools that make their labour productive, whether these are higher cost items, such as tractors, that donors or the government can provide for community use, or more affordable ones, such as treadle pumps for irrigation, that farmers can invest in themselves.

Aims: To train participants in cooperative mechanised agriculture through the production of crops for processing; to show the national government and development community that this is an effective approach to improving agricultural productivity in rural areas.

Process: We will cultivate land on the Technology Village site and plant and harvest indigenous food crops (e.g. cassava; yam) and cash crops (e.g. sugar cane; groundut; oil palm; coconut palm).

Equipment Needs:

- Tractor with plough, harrow and trailer (x2)
- Treadle Pumps (x5)

Above: Ghana is green

Above: Palm Fruit Bunch

Tentative Project Cost:

Tractor with plough, harrow and trailer attachments (x2)	US$ 30,000
Treadle Pumps (x5)	US$ 500
Freight/Marine Insurance/Transport[1]	US$ 1,000
Import Duties and Taxes[2]	US$ 50
Total	**US$ 31,550**

[1] Estimated figure for importation of Treadle Pumps (quote from Kenyan supplier)

[2] Based on GRA's Import Tariff Schedule, Treadle Pumps only attract assorted fees aggregating to 3% of Cost, Insurance & Freight

Mechanised Crop Processing

Above: Palm Fruit in a Mill

Above: Villagers using a cassava grater

For many in rural Ghana, it is hard to earn a respectable living from farming, as they do not have access to crop processing equipment and therefore struggle to add significant value to their produce.

With appropriate training and mechanical equipment, however, rural farmers can process the crops they grow into marketable products, such as palm oil or gari (a Ghanaian staple food made from grated cassava), enabling them to move up the value chain and gain greater returns from their activities.

Aims: To train participants in the processing of cassava and other tubers, and production of oil from palm fruit and palm kernels, through the production of outputs for local consumption.

Process: Gari: The cassava is grated using mechanical graters. It is then put in sacks and pressed with screws press and hydraulic presses. The juice is then turned into starch or tapioca. The residue is dried and the fried in steel pans to produce gari.

Palm Oil: The palm fruit is stripped from bunches, boiled, and then pounded in a digester. It is then taken to a press in a bucket and the oil is pressed out and fried.

Palm Kernel Oil: The palm kernel is shelled and the fruit is boiled and pressed to obtain the oil.

Equipment Needs:

- Gari Production Equipment (Screw presses; cassava graters; steel pans)
- Palm Oil Production Equipment (Boiling pots; fruit digester; screw press)
- Palm Kernel Oil Production Equipment (Shelling tools; screw press)

Tentative Project Cost:

Gari Production Equipment	US$ 5,000
Palm Oil Production Equipment	US$ 5,000
Palm Kernel Oil Production Equipment	US$ 5,000
Total	**US$ 15,000**

FOOD/AGRICULTURE

Local Animal Husbandry

Rearing local animals offers many can offer many benefits to rural agriculturalists.

Poultry rearing, in particular, yields a range of marketable products – from meat and eggs, to down and feathers for manufacturing clothing. Droppings can also be used in the production of compost, creating closed loops in the broader agricultural operation.

Other indigenous land animals such as snails and grasscutters, as well as fish and crab farming, can provide a sustainable source of meat for local consumption.

Aims: To promote the availability of sustainably sourced local meat and other foods, to develop sustainable income generation opportunities, and to reduce the costs of local agriculture by educating community members in appropriate animal rearing practices.

Process: Housing for the various animals must be constructed and equipped with the relevant facilities. Then the animals must be procured – chicks can be bought from local suppliers, while other animals, such as snails and crabs can be obtained off the land.

Equipment Needs:

- Animal housing materials (wood; fencing etc)

Above: Cattle herding, Cape Coast

Above: Poultry inspired coffin – shows the central role of animal rearing in traditional agricultural life

Tentative Project Cost:

Chicks (x100)	US$ 100
Housing materials	US$ 2,000
Total	**US$ 2,100**

Clothing & Medicine

Clothing

In the sphere of clothing, the key approach we will pursue will be to facilitate the provision of training in textile working.

This is an approach that Dr Sam has a great deal of experience with – the Appropriate Technology Centre currently runs an apprenticeship program in various villages in Ghana's Central Region that provides sewing training to girls who do not have access to secondary education, enabling them to participate in the production of clothing for the local market.

By providing young, disenfranchised, members of the village community with training in technical skills relevant to apparel work, we can help them access income-generation opportunities in their community, and help develop the local garment industry by creating a pool of skilled labourers.

Within the community we will also conduct practical tests on local fibrous materials (such as banana shoots) to determine their suitability for textile-making.

Tentative Project Cost:

Textile processing equipment (sewing machines etc.)	US$ 500
Working capital for training activities	US$ 500
Total	**US$ 1,000**

Medicine

As Dr. Sam's own experience attests, traditional herbs in Ghana can present a viable alternative to Western medicines. He acknowledges that some practitioners may have a bad reputation, but is nevertheless adamant that this should not discredit the work of those who are genuinely helping people. "Some herbalists may be a sham, but so are many pastors," he muses, "but people still go to church."

Under the technology village model, we intend to foster the development of traditional Ghanaian medicine by conducting practical tests to evaluate the efficacy of traditional cures to common local maladies, such as malaria, and training community residents in the cultivation and harvesting of these herbs. By conducting this work, we hope to support the development of commercial production of traditional herbs in Ghana.

Tentative Project Cost:

Cultivation/Harvesting tools	US$ 500
Working capital for training activities	US$ 500
Total	**US$ 1,000**

Operations

Staff

In terms of staffing, our project's main areas of need are in administration, accounting and training coordination. We anticipate that we will need no more than three full-time staff members to fill these roles.

University of Cape Coast students in departments such as Agricultural Science and National Service volunteers can be of use to us in implementing and coordinating the technical aspects of our project

Insurance

We intend to purchase an Employer's Liability policy to ensure that we have coverage for personal injury that may result to our employees.

Transport

Our main transport need concerns the transportation of materials around the project site. For this purpose, we anticipate that will need a pickup truck (a second hand vehicle will suffice).

Power

Grid electricity is not always available in rural Ghana – some areas have yet to receive electrical infrastructure, while in others the supply of electricity is unreliable.

Solar power presents an appropriate solution to rural electricity challenges. It utilises a resource that is plentiful in Ghana – sunlight, and the development of a distribution network for solar power systems in Ghana means this technology is becoming more affordable for rural Ghanaians.

We intend, in as far as possible, to use solar power as the predominant source of electricity for the project. For example, the electricity for lighting and fan cooling in dwellings can be provided by solar power. In doing so, we hope to reduce the environmental impact of the project and showcase the technology to surrounding communities.

For all power needs that cannot be met using solar power, we will initially use power generators.

Registration

To facilitate the implementation of the project, we will restructure the Appropriate Technology Centre organisation, to ensure it has the capacity to manage a project of this size. As part of this process we may be required to re-register the organisation and pay the appropriate fees.

Tentative Operating Costs (once all training activities are established)

Staff salaries (x2)	US$ 24,000
Employer's Liability insurance policy	US$ 8,000
Pickup truck (second hand)	US$ 15,000
Solar power systems (x10)	US$ 15,000
Generators (x2)	US$ 3,000
Registration fees	US$ 500
Total	**US$ 65,500**

04.

The Appeal

If you only take one lesson away from what you've read here, let it be this: Africa is not a basket case. Many of the continent's people may be poor, but they are also innovative, creative and dedicated. Africa's rural poor don't need the outside world to give them direction, they need to be empowered to design and follow their own.

By supporting AproTech Ghana and the Technology Village project, you are not only supporting the empowerment of a poor rural community in Ghana's Central Region, but also that of many others like it, in Ghana and across Africa. With whatever resources we can raise, we intend to show the development community that giving the poor the right tools to make productive use the resources around them can reduce poverty, by developing a model that can be reproduced and scaled to benefit poor communities across the continent. We will take the signal of appropriate technology, as Dr Sam says, and "put it into an amplifier."

With your support, we hope to realise Dr Sam's vision of fostering a new economic model of African self-sufficiency that delivers real development – development that is sustainable, equitable and actually felt in the lives of the poor.

Thank you.

Apro Tech Ghana

www.aprotechghana.wordpress.com
aprotechghana@gmail.com