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MEPPEL SAND DAMS PROJECT 2007-2008 REPORT

**SAND DAMS IN MATHIMA LOCATION,
MUTOMO DISTRICT KENYA
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SUMMARY

The project was implemented in four phases for a period of 1 ¼ a year from September 2007 to December 2008 and in total ten dams were constructed in three sub locations of Mathima location, Mutha division.

Eight dams are in Kiimani sub location. One dam is in Kengo sub location and another dam in Kivyuni sub location. During the period of implementation two dams collapsed; (Makosi dam) collapsed in its early stages of construction and was abandoned while the other (Masilingi dam) collapsed in its initial stages and also abandoned. They were replaced with Kwa Mariam and Kwa Kavemba dams respectively.

In terms of catchment specification, three dams are in Muvuko catchment and seven dams in Musila catchment. Muvuko catchment covers some part of Kiimani sub location and stretches to adjacent Kanziko location while Musila catchment covers the larger part of Mathima location and cuts at the centre of the location to the neighboring Voo location.

SUMMARY TABULATION OF THE PROJECTS

Name of dam	Sub-loc	Status	Members	Month started	Month completed	Cost (Kshs)	School names
Ilika	Kengo	Complete	18	September 07	January 08	683,075	Woldstroom Havel. Vrije school M.
Kwa Kavemba	Kiimani	Complete	31	November 07	March 08	739,250	De koedijksladen MGR Niermanschool
Kwa Nzamba	Kivyuni	Complete	45	March 08	June 08	753,225	Annefrankoosterb De wel nijeveen
Makutano	Kiimani	Complete	46	February 08	Mid July 08	598,285	Oosterboerschool Deberkenhorst staphost
Kwa Mariamu	Kiimani	Complete	41	May 08	Mid July 08	743,515	Konbeatrixschool Commgaarlandt
Kituluni	Kiimani	Complete	35	August 08	December 08	738,620	Annefrank Centrum Reestoeverschool
Kavuti	Kiimani	Complete	32	July 08	October 08	714,680	De woldstroom Meppel Zuiderbasisschool
Muumba	Kiimani	Complete	26	July 08	December 08	895,865	Het kompas Meppel Joh Calvijn school Meppel
Kanyunga	Kiimani	Complete	45	September 08	December 08	659,280	De Bron Nijensleek CNS staphost
Katuluviyethi	Kiimani	Complete	27	August 08	October 08	647,080	De Akker Meppel De Tolter Meppel
TOTALS			346			7,172,875	

INTRODUCTION

Arid and semi-arid lands in Kenya cover about 80% of the Kenya's land surface and harbors about 30% of the total population. Previously these areas were seen as areas without potential for development. However given the crowding in the high potential areas, attention has shifted to these areas. It is based on the vast lands potential for increasing food supply to the growing urban population that cannot be supported by the high potential areas. However, production potential is limited by the scarcity of water in these areas, which have fertile soils.

Mutomo district covers an area of about 12, 965 sq km with a population of more than 250,000. It is one of the districts with extreme water scarcity. Until recently, this district was given very low attention by the government. Most development was left to non-governmental organizations.

The area is characterized by low rainfall, not more than 500ml pa, high temperatures and high evaporation rates. The rainfall is poorly distributed in time and space. The area suffers from drought and famine repeatedly. Most families rely on charcoal burning to support themselves, which lead to serious environmental degradation.

SAND STORAGE DAMS FOR ARID LANDS WATER MANAGEMENT

SASOL foundation is an NGO concerned with creating a water platform in the arid lands, particularly in Kitui district, which includes Mutomo. Such a platform will counter the scarcity of water in the region. A sand storage dam is a masonry wall build across a seasonal stream to harvest sand and to store water during the rainy season and to hold it for utilization in the dry months of the year. Sand dams provide communities with domestic water whilst creating artificial wetlands that transform the lands through ground water recharge.

This report is about the second funding for the Mutomo community in Kitui South through the MEPPEL Rotary clubs' funding. The first funding was for one sand dam and a water tank in Ekani primary school and its environs in September 2006. The current funding was for ten dams in Mathima location, Mutha division, and Mutomo district.

IMPLEMENTATION PROCESS

The construction of the dam is through a series of participatory processes that involves community organization and mobilization through organized local public meetings, locally called barazas, in

specific administrative boundaries. Site identification is done in conjunction with the local community where their interests are considered but siting is based on technical criteria of the channel characteristics. The specific community, with guidance and supervision from SASOL staff, does trenching and local materials collection. A SASOL artisan then constructs the dam with the community providing the unskilled labour; thereafter, a community capacity building training is done to the dam community.

The process of dam is costed and implemented as follows:

Activity	%
Baseline data collection	2
Community mobilization and organization	6
Site identification, clearing, setting and pegging	2
Resources mobilization	22
Trenching	22
Construction	38
Community training	8
Total %	100

IMPLIMENTATION PLAN 2007-2008

The dams were constructed in four phases spread across the implementation period but it should be noted that some dams had to spill over to the next phase due to some issues specific to particular dams in respect to their size and level of community participation.

Phase One

Period: July – November 2007
 No. of dams Two: - Ilika dam in Kengo sub location
 Kwa Kavemba dam in Kiimani sub location

Phase two

Period: January – April 2008
 No. of dams Three :- Kwa Nzamba in Kivyuni sublocation
 Makutano in Kiimani sub location
 Kwa Mariamu in Kiimani sub location

Phase three

Period: April – August 2008
 No. of dams Three: - Kituluni in Kiimani sub location
 Kavuti in Kiimani sub location
 Muumba in Kiimani sub location

Phase four

Period: September – November 2008
 No. of dams Two: - Katuluvi -yethi in Kiimani sub location
 Kanyunga in Kiimani sub location

For the capacity building, community trainings are done at different levels of the dam construction, site management is done at the initial stages of the dam during mobilization then bulk of training is done later as discussed hereunder.

Natural Resource Management

This covers the sustainable utilization of the natural resources to improve community livelihoods and to embrace inter generational equity over the same resources. It equips the communities with

the knowledge on how to use the local resources and develop their areas without relying on imports from other areas. This helps them realize that their area is a self-sustaining entity that can develop with minimal or no imports.

Project Management

This is made purposely to equip the community in managing their collective projects and thus assist them in forming development conscious groups that will gear the community in the utilization of the available resources in the region. The training tackles critical issues on leadership skills and management challenges that needs to be addressed that are hindrance to development

Participatory Hygiene and Sanitation Transformation

Water is a media where many of the bacteria and disease causing agents can proliferate and spread diseases across the community, which depends on the physical health of its individuals for development. This is the rationale that the community has to be trained on their collective responsibility in maintaining the health of the community by imposing disease barriers of the most common diseases that affect them and affiliated with water.

IMPLEMENTATION APPROACH

The implementation of the projects is purely on participatory principles. It is done right from identification of the exact position of the dam with high consideration of the community social factors as well as the dam technical considerations. This is done by inclusion of community members, community leaders and SASOL technical staff. The community has to contribute the local materials and also the unskilled labor amounting to 40% of the total dam cost. SASOL provides the external materials like cement, reinforcement bars, water, food and skilled labour. Typically this is 60% of the dam cost.

The community involvement and participation approach helps the community to own the project. This is fundamental for the sustainability of projects. Having participated in all the processes of implementation, the community will actively make use, protect and maintain it.

Technical staff is critical in the implementation process. Three artisans are involved directly in the construction of the ten dams in the region. They spending six full days a week in construction and site organizing and supervision. One full time community organizer is needed for mobilization of the communities' collection of local materials, provision of unskilled labour and supervision of the dam construction. Extra technical staff are pulled in for specific training and technical supervision, evaluation and overall management.

PROJECT AREA

The project area is Mathima location on the East side of the Mutomo District with six sub locations Kiimani, Kivyuni, Kengo, Kiati, Mivuni and Ndilili. The area is a water divide with two catchments; Muvuko catchment flows to the East West and Musila Catchment to the South. Two dams are on Musila River in the South catchment. Five dams are on the tributaries of the Musila River. The other three are on the Muvuko catchment. Administratively they are distributed as follows: One dam in Kengo sub location. One dam in Kivyuni sub-location and eight dams in Kiimani sub-location.

It is worth noting that not all streams have viable sites for the dam construction and sand storage dams have the greatest impact when in cascades thus our distribution is just on this principles but not under administrative boundaries.

SPECIFIC SITE COMPLETION REPORT

For the funding of ten dams due for implementation in the period September 2007 to November 2008. SASOL has overseen the construction of the dams in the order that they are presented

below. They were completed by the end of December 2008, one month behind the schedule. Timeliness of funding and staff under funding basically caused the delay.

Dam One: Ilika Dam

The dam was completed in December 2007, and since then we have had two rain seasons with the community being able to accrue some benefits. Its impacts have been able to change community attitudes towards sand storage dams. The dam is near the location headquarter, Katyethoka Market, about a kilometer from the major shopping centre. There is also a primary school within the dam catchment area. Kivyuni Primary that is expected to benefit from the dam water with enrollment of 363 pupils spread in eight classes. Currently the community is actively engaged in the digging of the well and soon a hand pump will be installed and the project officially handed over to the community.

During the construction, eighteen households (18) participated. Each household has 7 people on average, making a total population of 126 people. However, the secondary beneficiaries are drawn from the entire Kengo sub location with a total population of 2844 people and the neighboring sub locations making it a total of over 2844 people.

The dam took more time in the process of mobilization; the community had a negative attitude based on the fact that the colonial and postcolonial dams in the area had really taken a long time to bring impacts. However, through community trainings and mobilization, positive response is evident and the community is very much cooperative in the construction and have shown interests in building more dams in the same catchment.

Ref: picture 1; community participants during a community capacity building training session.
 Picture 2; local resources (hardcore) and dam trench.
 Picture 3; Complete dam after one rain season.

Financial report for the Ilika Dam

Material	Quantity	Ilika
		Cost
Cement	325	255,125
Round bars ½	20	14,400
Round bars ¼	30	6,000
Timber (feet)	100	1,800
Polythene (meters)	20	3,000
Nails (kgs)	1	80
Hand pump	1	28,000
Tools		9,670
Water		37,600
Artisan/ labour		55,000
Site management		100,000
Transport		45,000
Community Training		69,000
Community feeding		16,000
Administration/overhead		32,400
TOTALS		683,075

The financial report shows that we are within the budget.

Dam Two: Kwa Kavemba dam

The dam was completed in late February and so far only two rain seasons have been received and the dam has harvested enough sand, with the community being able to accrue some benefits out

of the little water that collects in it. The community is also under doing the shallow well digging stage with bricks for well construction ready and soon construction of the well will commence. There are also two primary schools within the dam catchment area, Kiimani and Kaindu Primary schools who will have a direct benefit from the dam. Kaindu has enrolment of 340 pupils and Kiimani with 370 pupils.

Community participation for the dam was quiet good and we hope to build more dams in the area, 31 households participated hence the primary beneficiaries of the dam. Each household has 7 people on average making a total population of 217 people. However, the secondary beneficiaries are from the entire Kiimani sub location and the neighboring sub locations making it a total population of over 1850 people.

Time frame

Community organization for the dam started late towards the rainy season as a replacement of the collapsed Masilingi dam and community members were busy preparing their farms for the rain season thus we could not complete the dam in the stipulated time frame, it took us 4 months to have it completed.

Pictures

- Ref: Picture 1; Community participating in preparation of mortar for construction.
- Picture 2; Community participate in the construction.
- Picture 3; Complete dam.

Financial Report Kwa Kavemba Dam

Kwa Kavemba Dam		
Material	Quantity	Cost
Cement	375	294,375
Round bars ½	20	14,400
Round bars ¼	30	6,000
Timber (feet)	100	1,800
Polythene (meters)	20	3,000
Nails (kgs)	1	80
Hand pump	1	28,000
Tools		19,670
Water		43,400
Artisan/ labour		55,000
Site management		100,000
Transport		45,000
Community Training		69,000
Community feeding		19,000
Administration/overhead		32,400
TOTALS		739,250

Dam Three: Kwa Nzamba dam

The dam is completed and its shallow well constructed and a pump installed. After one rain season it filled with sand to the brim with some little water oozing at the bottom of the well. This the community utilized for one week. Community participation was satisfactory with 45 households participating. Each household has 7 people on average making a total population of 315 people. However, the secondary beneficiaries are drawn from the entire Kivyuni sub location and the neighboring sub locations such as Kiimani and Kiati making it a total of over 3112 people. The dam is will be used by the students of Mathima secondary school and pupils of Kathingu primary school with enrollment of 60 pupils.

Time frame

The community was very positive and participated actively in the project and for the first time we were able to have a dam completed within the 3 months planned time frame.

Pictures:

- Ref:** Picture 1; Local resources ie sand, hardcore, as well as trenching by the community
 Picture 2; off take well undergoing construction
 Picture 3; complete dam and off take well

Financial report Kwa Nzamba Dam

Kwa Nzamba Dam		
Material	Quantity	Cost
Cement	350pcs	278,250
Round bars ½	20pcs	21,000
Round bars ¼	30pcs	11,250
Timber (feet)	50	900
Polythene (meters)	-	-
Nails (kgs)	1	120
Binding wire	2	240
Hand pump	1	28,500
Tools		24,765
Water		35,200
Artisan/ labour		42,000
Site management		120,000
Transport		78,500
Community Training		69,000
Community feeding		25,100
Administration/overhead		37,400
TOTALS		753,225

The cost analysis of mobilization for this dam is high. This is as a result of the cost of mobilization of the collapsed Masilingi dam, which is within this dam cost. The materials such as cement and the reinforcement bars due for Masilingi were all transferred to this dam. However, the replacement of the Masilingi was the Kwa Kavemba dam.

Dam Four: Makutano dam

The dam was completed before the rain season and has harvested a lot of sand and indicators show that in future it will be a high water yielding dam. Community participation was on average 46 households. Each household has 7 people on average making a total of 322 people. However, the secondary beneficiaries are drawn from the entire Kiimani sub location and the neighboring sub locations making it a total population of over 1850 people. The name of the dam is drawn from a Swahili word (Makutano) meaning a junction between two roads, or a place where people come together; there is also a shopping centre in the locality and a nursery school with the same name 'Makutano'.

Pictures:**Ref:** picture 1; Community participating in a dam construction exercise.

Picture 2; Dam under going construction.

Picture 3; Complete dam.

Time frame

The dam had special challenges during its construction especially getting water for the construction was a real problem, this is the reason why it was not completed within the stipulated time frame of three months, it took 5 months to be completed.

Financial Report Makutano Dam

Makutano Dam		
Material	Quantity	Cost
Cement	300	238,500
Round bars ½	20	21,000
Round bars ¼	30	11,250
Timber (feet)	50	900
Polythene (meters)	-	-
Nails (kgs)	1	120
Binding wire	2	240
Hand pump	1	28,500
Tools		24,765
Water		34,510
Artisan/ labour		43,500
Site management		100,000
Transport		45,000
Community Training		72,000
Community feeding		30,600
Administration/overhead		37,400
TOTALS		598,28

Dam Five: Kwa Mariamu dam

After the collapse of the Makosi dam, the community was divided into two groups, one group went ahead to construct this dam and was named after a hardworking lady of the Makosi dam 'Mariamu' who also happened to be near the dam and also provided the store for the materials in one of her houses in the homestead. So far the dam has harvested enough sand to store water and the community is very positive about it.

Soon after the divide some more new members joined the group and improved the community participation, so the divide did not affect the dam construction. 41 households participated hence the primary beneficiaries of the dam. Each household has 7 people on average making a total of 287 people. However, the secondary beneficiaries are drawn from the entire Kiimani sub location with a total population of 1850 people and the neighboring sub locations making it a total of over 1850 people.

The dam is a potential solution to water scarcity to shopping centers: Katitu and Kisayani market as well as the Makosi primary school.

Time frame

The dam is one of the fast constructed, it had taken the shortest time possible for the entire implementation process. The completion of the dam was in time due to the active participation of the community.

Pictures: Ref: Picture 1; Community members collecting local resources. Picture 2; Dam undergoing construction. Picture 3; Dam construction complete with school names on the walls

Financial Report Kwa Mariam Dam

Kwa Mariamu Dam		
Material	Quantity	Cost
Cement	300	238,500
Round bars ½	20	21,000
Round bars ¼	50	18,750
Timber (feet)	50	900
Polythene (meters)	5	1,000
Nails (kgs)	1	120
Binding wire	2	240
Hand pump	1	28,500
Tools		24,765
Water		25,060
Artisan/ labour		70,000
Site management		120,000
Transport		60,000
Community Training		69,900
Community feeding		27,380
Administration/overhead		37,400
TOTALS		743,515

Comments: The dam cost includes the cost of the collapsed dam, Makosi. The cost is reflected in the mobilization, feeding and artisan (skilled labour for 2 months)

Dam Six: Kituluni

The dam was completed in December 2008. Famine led to migration of youth to urban centers to supplement family incomes. Community participation for this dam was very low. Women did most of the work. Local materials, sand and hardcore, were far from the dam. 35 households participated. Each household has 7 people on average making a total population of 245 people. However, the secondary beneficiaries are drawn from the entire Kiimani sub location and the neighboring sub locations making it a total population of over 1850 people. The dam is a potential solution to water scarcity in two shopping centers, Katitu and Kisayani, as well as the Makosi primary school.

Time frame

The dam was planned for October 2008 but due to the field challenges facing the community we only managed to have the dam completed during the December 2008 period.

Pictures

Ref: picture 1; Community members in a dam trenching exercise. Picture 2; Heap of collected local resource (hardcore). Picture 3; Complete dam with school names on the walls.

Financial Report Kituluni Dam

Kituluni Dam		
Material	Quantity	Cost
Cement	350	295,750
Round bars ½	20	21,000
Round bars ¼	30	10,500
Timber (feet)	50	900
Polythene (meters)	-	-
Nails (kgs)	1	120

Binding wire	2	240
Hand pump	1	28,500
Tools		19,670
Water		38,720
Artisan/ labour		42,600
Site management		100,000
Transport		45,000
Community Training		69,900
Community feeding		33,320
Administration/overhead		32,400
TOTALS		738,620

Dam Seven: Kavuti

The dam was completed by October 2008 as we had planned due to the strong interests of the community. They are ready to construct more dams. 32 households participated hence the primary beneficiaries of the dam. Each household has 7 people on average making a total of 224 people. However, the secondary beneficiaries are drawn from the entire Kiimani sub location and the neighboring sub locations making it a total population of over 1850 people. The dam will be a water source for more than 35 households and pupils of Kaindu primary in the neighborhood environs.

Time frame

We managed to have the dam completed within our time frame of 3 months despite the famine for the community was fired up.

Pictures:

Ref: Picture 1; Community members undertaking a dam trenching exercise.

Picture 2, Local resources (hardcore, sand respectively) collected by the community.

Picture 3, Complete dam with school names on the wall

Financial Report Kavuti Dam

Kavuti Dam		
Material	Quantity	Cost
Cement	350	295,750
Round bars ½	20	21,000
Round bars ¼	30	10,500
Timber (feet)	100	1800
Polythene (meters)	-	-
Nails (kgs)	1	120
Binding wire	2	240
Hand pump	1	28,500
Tools		19,670
Water	32400 litres@1	32,400
Artisan/ labour		42,600
Site management		100,000
Transport		45,000
Community Training		69,000
Community feeding		15,700
Administration/overhead		32,400
TOTALS		714,680

Dam Eight: Muumba

The dam was completed by end of December 2008. Construction was disrupted by the November rains. It is a special dam in that it is sub-surface. The river has enough sand and at that point it was not logical to raise the wall above the riverbed. For the dam construction, 26 households participated. Each household has 7 people on average making a total population of 182 people. However, the secondary beneficiaries are drawn from the entire Kiimani sub location and the neighboring sub locations making it a total population of over 1850 people. The dam is a source for the Kiimani and Kaindu primary school community. The community is very much organized and they have already started raising tree seedlings using the water that had been captured by the dam, which was in progress in the November rains.

Time frame

The dam completion was planned for October, but the famine situation led to low community participation. It was completed by end of December 2008 within a period of 6 months.

Pictures:

Ref: Picture 1; Local resources (hardcore) collected by the community.

Picture 2; Dam trench done by the community.

Picture 3; A complete sub surface dam with a pillar with school names on it.

Financial Report Muumba Dam

Muumba Dam		
Material	Quantity	Cost
Cement	480	405,600
Round bars ½	20	21,000
Round bars ¼	40	14,000
Timber (feet)	100	18,000
Polythene (meters)	-	-
Nails (kgs)	1	120
Binding wire	2	240
Hand pump	1	28,500
Tools		24,765
Water		47,920
Artisan/ labour		55,000
Site management		100,000
Transport		45,000
Community Training		69,900
Community feeding		33,420
Administration/overhead		32,400
TOTALS		895,865

Dam Nine: Kanyunga

The dam was completed by the end of December 2008. The community was not active due to the drought that had hit the area. Only a few people turned up for the project and also in most cases they had to leave earlier before noon. This is contrary to what the same group did in the 'Kwa Mariamu' dam. The dam was completed when the rains were over. It is yet to harvest sand and water. 45 households participated. Each household has 7 people on average making a total population of 315 people. The secondary beneficiaries are the entire Kiimani sub location and the neighboring sub locations making a total population of over 1850 people. The dam, central to the sub-location and will impact on Katitu and Kisayani markets as well as Makosi primary school.

Time frame

The dam, completion planned for November, given the 'Kwa Mariamu' dam experience, was completed towards the end of December within a period of 4 months.

Pictures

Ref: Picture 1 Local resources (hardcore) **Picture 2;** Community participation. Picture 3; Front view of the dam.

Financial Report Kanyunga Dam

Kanyunga Dam		
Material	Quantity	Cost
Cement	270	228,150
Round bars ½	20	21,000
Round bars ¼	30	10,500
Timber (feet)	50	900
Polythene (meters)	-	-
Nails (kgs)	1	120
Binding wire	2	240
Hand pump	1	28,500
Tools		19,670
Water		29,700
Artisan/ labour		42,600
Site Manag.		100,000
Transport		45,000
Community Training		69,900
Community feeding		30,600
Administration/ overhead		32,400
TOTALS		659,280

Dam Ten: Katuluvi-yethi

The dam was completed by October earlier than we expected. The community was very active despite the famine and the alarming water scarcity in the region; the community struggled to have the local materials at site. After completion, we had one rain season with community getting some water, which collected in the dam before been filled with sand and the thirsty soil absorbing it.

The community actively participated in this dam although the households are few we received more than two individuals from one household, 27 households participated hence the primary beneficiaries of the dam. Each household has 7 people on average making a total of 189 people. However, the secondary beneficiaries are drawn from the entire Kiimani sub location with a total population of 3112 people and the neighboring sub locations making it a total of over 3112 people. The dam is potential water solution to Kimani Primary and Kilongoni Primary and the inhabitants of Yethi village.

Time frame

The dam was expected to be completed by November but was completed earlier than we expected due to the willingness and cooperation of the area communities within a period of 1 ½ months.

Pictures

Ref: picture 1; Local resources (hardcore). Picture 2; Community participation. Picture

3; Dam with some water. Financial Report Katuluvi Yethi Dam

Katuluvi yethi		
Material	Quantity	Cost
Cement	270 @845	228,150
Round bars ½	20 pcs @150	21,000
Round bars ¼	30 pcs @350	10,500
Timber (feet)	100 @18	1800
Polythene (metres)	-	-
Nails (kgs)	1 @120	120
Binding wire	2 @120	240
Hand pump	1 @28,500	28,500
Tools		19,670
Water		32,400
Artisan/ labour		42,600
Site management		100,000
Transport		45,000
Community Training		69,900
Community feeding		15,700
Administration/overhead		32,400
TOTALS		647,080

GENERAL CHALLENGES

1. Poor maintained roads that are impassible thus problems in transporting of materials.
2. Delay in supply of cement by suppliers due to high demand of cement in the country.
3. Famine hence low community participation. And thus being caught up by rains.
4. Low participation as a result of different approaches to development implementation strategies such as food for work, wages among others by other development agencies.
5. Low community participation with respect to the dam maturity period. According to experience from previous dam (Kwa Nzamba) built in colonial times, it took 70 years to realize any benefits due to technical failures.

APPRECIATION

Water is central to development and has been and remains a drawback in the arid lands development. There is no single answer to the dry lands water problems but one thing is for sure that, if there is an answer, then it must be in harvesting the rainwater that comes in spells.

The Mutomo community appreciates the intervention by the MEPPEL Rotary clubs through SASOL Foundation, Kitui - Kenya, for having sponsored the construction of the rainwater harvesting structures. With the concentration of the dams in cascades, will ensure production water for this very dry region with direct impacts on health, economy, education and ultimately sustainable development.

