

Pathogens, Parks and People: Assessing the Role of Disease in Trans-Frontier Conservation Area Development

Mid-Term Progress Report for the Wildlife Conservation Society
AHEAD Great Limpopo Trans-Frontier Conservation Area
Seed Grants Program

June 2009

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Introduction

Disease is a major burden for conservation and regional development in sub-Saharan Africa, where many countries struggle to control human infectious diseases like tuberculosis and HIV / AIDS, and vector-borne pathogens that cause malaria and other illnesses. The development of Trans-Frontier Conservation Areas (TFCA's), through the amalgamation of national parks, protected areas, conservancies, private and communal lands to form contiguous landscapes, may provide one route to economic development in marginalised areas through increased tourism and associated employment. However, with the removal of fences, the resulting unrestricted movement of wildlife, people and livestock across formally regulated international and park boundaries may increase the potential for disease to be transmitted between species, and into areas currently regarded as 'disease-free'.

An increase in disease, particularly zoonotic pathogens like bovine tuberculosis, rabies, brucellosis and anthrax has a direct negative impact on wildlife conservation through increased species mortality; agricultural and natural resource sustainability through decreased production and livestock mortality, and public health. The presence of disease impacts on community health and livelihoods, especially on people who rely heavily on livestock for food and economic security. This coupled with the increased risk of zoonotic infection due to the extremely high levels of HIV / AIDS and tuberculosis co-infection in southern Africa, means that the links between human and animal health need to be understood.

The success of TFCA's, like the Great Limpopo Trans-Frontier Conservation Area (GLTFCA), relies on the perceived benefit to regional economies and local communities across diverse scales and backgrounds. But, despite the impact that disease can have on both communities and conservation; there are currently no formal guidelines for disease policy or management in the GLTFCA. This project aims to support disease policy development by providing information on risk factors for zoonotic disease transmission between wildlife, livestock and human populations in the GLTFCA.

This report will summarise the development of this project to date, with reference to the objectives outlined in the WCS *AHEAD* GLTFCA Seed Grant Proposal, September 2008.

Project Goals

To identify and prioritise the risks of zoonotic disease transmission at the interface between human, livestock and wildlife populations adjacent to the Great Limpopo Trans-Frontier Conservation Area.

Specific Objectives

- i. Quantify the role of local land use, human livelihood, agriculture, cultural practices and proximity to wildlife conservation areas, on the risk of zoonotic disease transmission between wildlife, livestock and human populations in the GLTFCA.
- ii. Delineate the practical risk factors for bovine tuberculosis disease transmission and other zoonotic diseases between wildlife, livestock and human populations in the GLTFCA.
- iii. Record the current disease concerns and awareness of zoonotic disease of local people and health service providers in communities, parks and conservancies in the GLTFCA.
- iv. Provide estimates of current and potential impacts of zoonotic disease on the health of communities and livestock, and associated impacts on conservation initiatives like the GLTFCA.

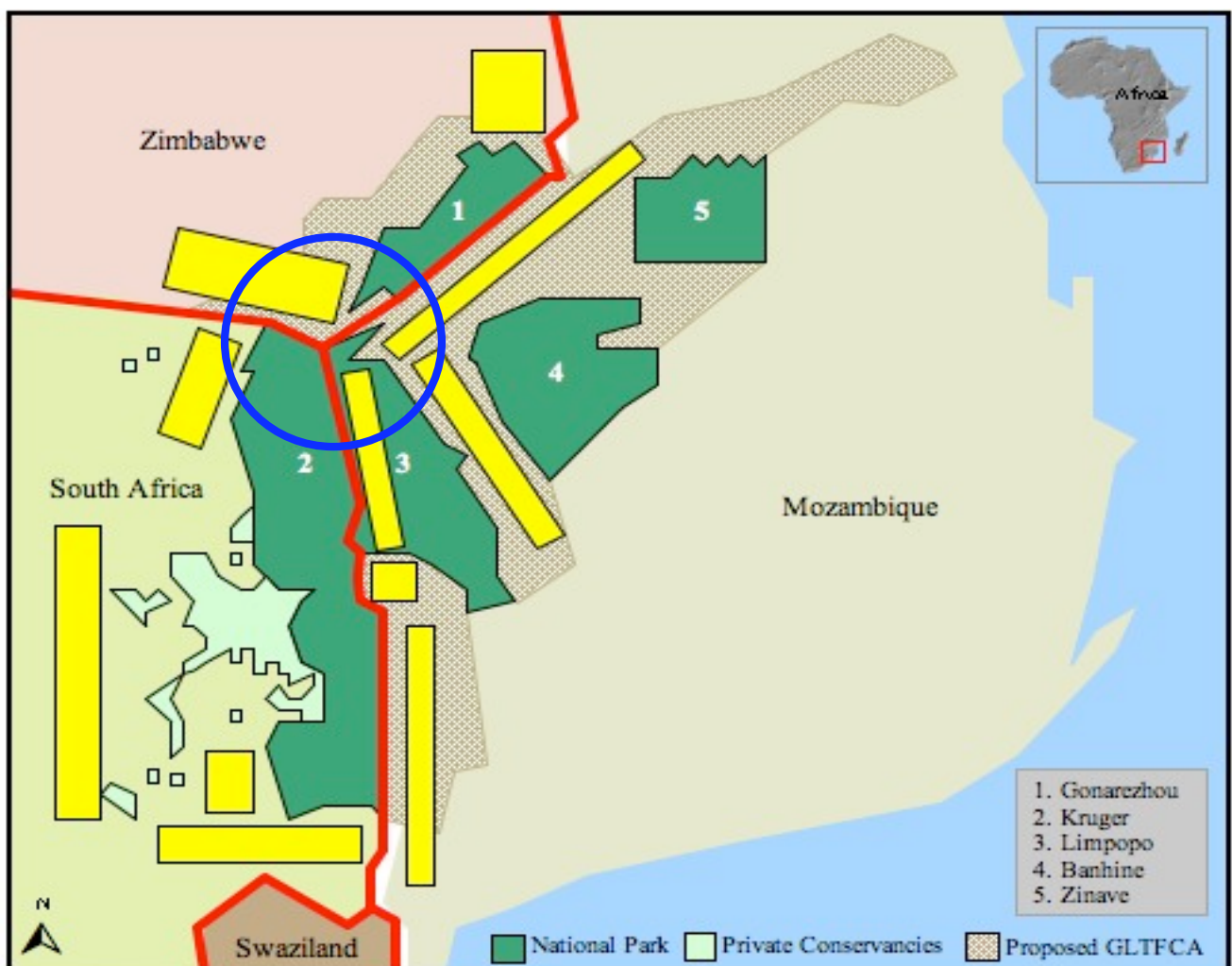


Farmers on the way to an Animal Health Diptank, Chikombedzi, Zimbabwe, March 2009
(C. Geoghegan)

Study Area

The Great Limpopo Trans-Frontier Conservation Area was established in December 2002, and is depicted on Map 1 (below) in the grey-hashed outline. The GLTFCA covers three countries and spans 100,000km², including national parks in Mozambique, South Africa and Zimbabwe. Currently, more than 55% of the land within the GLTFCA is under communal tenure with varying forms of small-scale agro-pastoralism. Greater than one million people, and their livestock, live within the new GLTFCA boundaries, as depicted in the yellow boxes on Map 1. Standards and accessibility to animal and human health care services varies throughout the region.

It is intended that a minimum of 300 questionnaires will be completed in populations up to 15km from the current boundaries of Kruger, Limpopo and Gonarezhou National Parks, shown in the blue circle. This is an alteration to the original proposal, which designated the study populations up to 15km from the boundary of Kruger National Park. This alteration is based on recommendations from stakeholders and collaborators working in the GLTFCA, who suggest that targeting an area across international and park boundaries will yield more focussed and relevant results. However, this decision is not intended to restrict the aims of the project, with the inclusion of sites in other areas of the GLTFCA welcome.



Map 1: Map of the GLTFCA study area, showing National Parks, communities and potential study sites in Mozambique, South Africa and Zimbabwe.

Summary of Progress to Date

This project aims to assess the links between human and animal health at the household, farm, community, village, sub-regional and regional scales in the GLTFCA. In order to accomplish this task, the project was divided into ten measurable steps, which were incorporated into the original proposal outline and timeline (See Appendix A), and are discussed below.

1. Questionnaire Development

Three questionnaires have been developed for use in this project, in collaboration with researchers from a range of disciplines, including social science, agriculture, conservation, epidemiology, medicine and veterinary science. Each questionnaire has been developed around a core set of questions, designed to identify the risk of zoonoses across the human and animal interface. These include: family demographics; income and food security; agricultural practices; animal and animal product use; human and animal disease history and awareness; animal and human movement and migration patterns; human and animal health service access and use; traditional medicine use; perceptions of the GLTFCA; and current problems, future fears and aspirations.

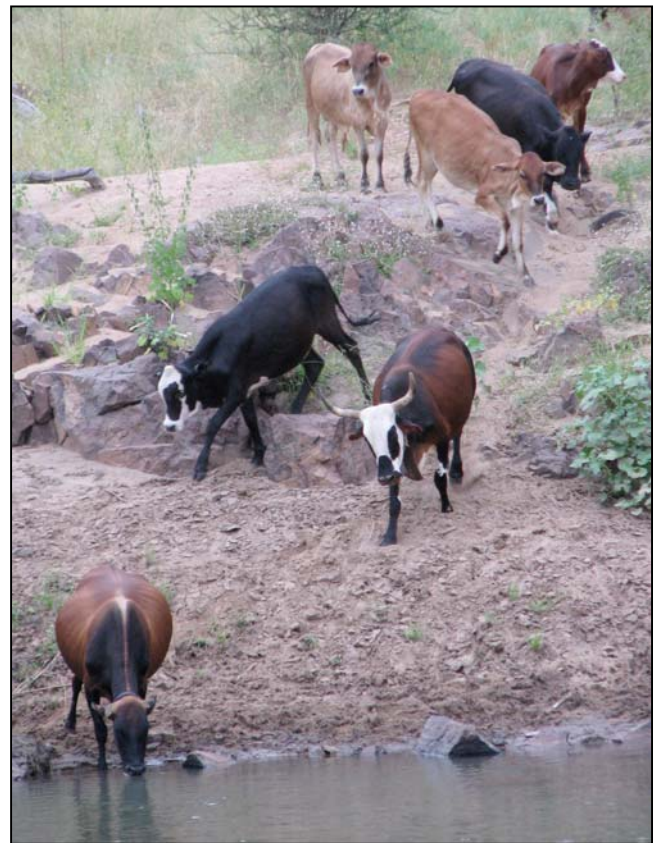
Due to the overlap of core questions in each questionnaire, information collected as part of this research will be comparable across the GLTFCA. However, in recognition that communities around the GLTFCA differ culturally, socially and in terms of their lifestyle and livelihoods, these questionnaires require ground-truthing at each study site.

For example, the picture below illustrates the complexities of land and water use on the boundary of Gonarezhou National Park in Zimbabwe. During a field reconnaissance in March 2009, in collaboration with CIRAD partners Michel de Garine Wichatitsky and Alex Caron, we were able to observe interactions between park employees (left), livestock (seen crossing the river, and on both river banks), and local residents (woman and child gathering water on the right) on the Limpopo River. Knowledge of these interactions enables us to adapt or expand the questionnaires conducted on these topics in this area. This will result in a more comprehensive assessment of disease risk for each group.





**Water Use on the Mwenezi River,
Zimbabwe, March 2009**
Clockwise from Top Left: Cows drinking; Asking livestock owners some questions; Children swimming, Using water to help cut hair; Cows coming down to the river to drink; Cows crossing the river, while a woman and child collect drinking water; Men fishing. (All pictures by C. Geoghegan)



1. Questionnaire Development Continued.

Each of the three questionnaires we have developed is designed to be suitable for a range of scenarios in each country.

Questionnaire One is a basic data capture form, compiled mostly of closed-answer questions. This will collect baseline data on demographics, behaviour and disease risk, when time is limited.

Useful applications may include animal health diptanks, community clinics, health centres or social arenas.

The average time for this questionnaire is 8 minutes.



NAME	DATE	TIME
DUMISA	17	03 09
NUALEKWANI	19	03 09
CHISHINJA	20	03 09
RUTANDARE	23	03 09
MADZE	25	03 09
MALIPATI	25	03 09
SAMU	18	10 09

Community Animal Health Diptank Schedule, Malipati, Zimbabwe, March 2009 (C. Geoghegan)

Questionnaire Two is a more extensive questionnaire, compiled of closed-answer questions with additional open-ended questions based upon answers. This is intended to collect more detailed information, particularly to address those with increased risk of disease based on occupation, animal ownership or personal health status.

Useful applications may include field abattoir sites, hospital patients, veterinary clients, and park employees.

The average time for this questionnaire is 30 minutes.



Field Abattoir, Malipati, Zimbabwe, March 2009. (C. Geoghegan)

Questionnaire Three is the most specific questionnaire, compiled mostly of open-answer questions. This will collect detailed data on household behaviours, risk profiles, agricultural practices and perceptions of disease when time is available.

Useful applications may include households within health districts, and selected members of the community.

The average time for this questionnaire is 1.5 hours, and requires making an appointment with the participants.



Typical Homestead, Malipati, Zimbabwe, March, 2009. (C. Geoghegan)

2. Questionnaire Development and Community Liaison, Animal Health

The questionnaires for this project have been further developed through liaison with local animal health groups, conservation organisations, research groups and national authorities in each country.

Visits with collaborating partners, like CIRAD in Zimbabwe, have enabled us to observe and identify local groups that can facilitate the use of questionnaires in their areas. This is particularly important in rural areas where there is a lack of health care information.

This project therefore endeavours to include local knowledge whenever possible, to build local capacity and assist with health care policy development within the local settings. By incorporating local advice on health care issues, we have adapted each of the three questionnaires to maximise the local relevance, while maintaining the integrity of the final output.

One particularly thought-provoking experience was during a visit to the Malipati State Veterinary Office near Gonarezhou National Park. While talking with the local Animal Health Technician, a local farmer arrived to request assistance with a field post-mortem. One of his cows had died unexpectedly, near the Mwenezi river. We accompanied the technician to the scene, and were able to experience the emotional loss and disease concern expressed by the farmer, his colleagues and family.

The relationship between the farmer and technician had been previously established through community education and liaison programmes developed by the local veterinary team. Upon identification of the reason for mortality (gall sickness), we then observed the practiced and meticulous removal of all body parts for home consumption and sale at the local market. The only item that was not consumed was a near full-term foetus, which was discarded in the bushes, and devoured by local dogs. And, after everything was removed, the bile from the gallbladder was scattered over the area for sacred reasons.

When discussing the loss and subsequent use of this animal, the farmers were unaware of what practices or behaviours may enhance or reduce zoonotic disease risks. Thus, we have adapted the questionnaires that will be used in this area to explore and quantify the indigenous knowledge of disease; something that we can only do due to our first hand experience and help from collaborators in the area. (See the next page for more information on this event)





Field Abattoir, Malipati, Zimbabwe, March, 2009
Clockwise from Bottom Left: Farmer and his cow that died of unknown causes near the river; farmer and friends begin the post-mortem with the local animal health technician; removal of the ribcage; the farmer's dog eats the unborn foetus; spreading of the gall bile on the post-mortem site; lung examined for bovine tuberculosis; the animal health technician inspects the gall bladder, determining the cause of death
(All pictures by C. Geoghegan)

3. Questionnaire Development and Community Liaison, Human Health

As with the aspects of animal health discussed in section 2, it is equally important that the local human health of each area is factored into the questionnaire development. To do this, we have spoken to doctors, nurses, community care workers, and clinic staff at each of the study sites; to ask their opinion on the main current disease issues affecting people in their areas.

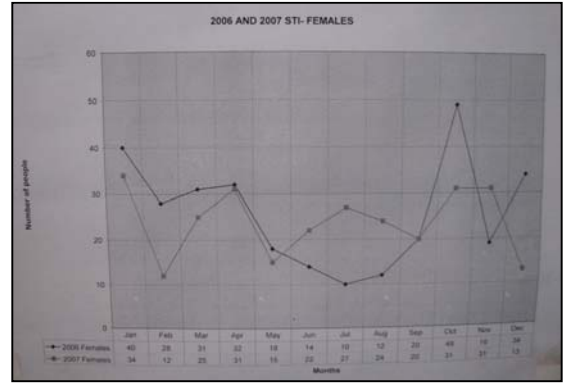
In many cases, despite a lack of laboratory, clinical and basic medical resources, clinics remain a key aspect of community health in many of the rural areas we have visited. Regardless of poor national funding and resource provision, many of the medical staff continue to collate and report disease outbreaks, in an attempt to provide public health services and lobby for assistance.

In areas surrounding Gonarezhou in Zimbabwe, we found qualified nurses and community health workers operating a daily clinic service. Many reported continuing difficulty with HIV / AIDS prevalence, tuberculosis and rabies; with treatment follow-up proving difficult without transport or communication resources. Malaria was often cited as the biggest problem, but the overuse of DDT prevention in local homes had resulted in human stomach illnesses and animal deaths. However, medication was usually available to treat malaria, and was therefore not as serious as other chronic diseases seen in the area.

Larger hospitals, including Chikombedzi are facing similar difficulties, but have retained doctors despite irregular salary payments. Tuberculosis and HIV / AIDS officers report an increase in prevalence, fuelled by poor nutrition and difficult living standards. With no access to transport, it is impossible for the hospital to respond to patients who are unable to travel independently; so follow-up on patients with chronic diseases is difficult.

To assist patients, the hospital has developed a nutrition garden, and provides educational facilities through a youth centre that operates daily. Here, patients can get confidential advice and testing for STI's and HIV / AIDS, although sadly 85% of those tested in 2008 were HIV positive. Medical records continue to be processed by the statistical team at the hospital, who report that Malaria, respiratory illness, tuberculosis and STI's are in the top five conditions reported in the years 2007 and 2008. However, there is a dearth of information at the local village and district level, where clinics cannot compile reports due to lack of electricity or staff.

This information has helped to guide the depth of human health questions included in our questionnaires. We will continue to adapt the surveys to each area to obtain information that is missing from national records, whilst prioritising the comfort and consent of the participants at all times.



Chikombedzi Hospital, Zimbabwe, March 2009
Clockwise from Top Left: The Cholera Observation Area, formally the TB ward; The Chikombedzi Youth Centre offer teenagers and young people a place to interact and get tested for common sexual diseases; The local STI disease statistics are posted on the wall of the youth centre; disease education poster for HIV / AIDS; Information on the wall of the TB office.
 (All photographs by Claire Geoghegan)

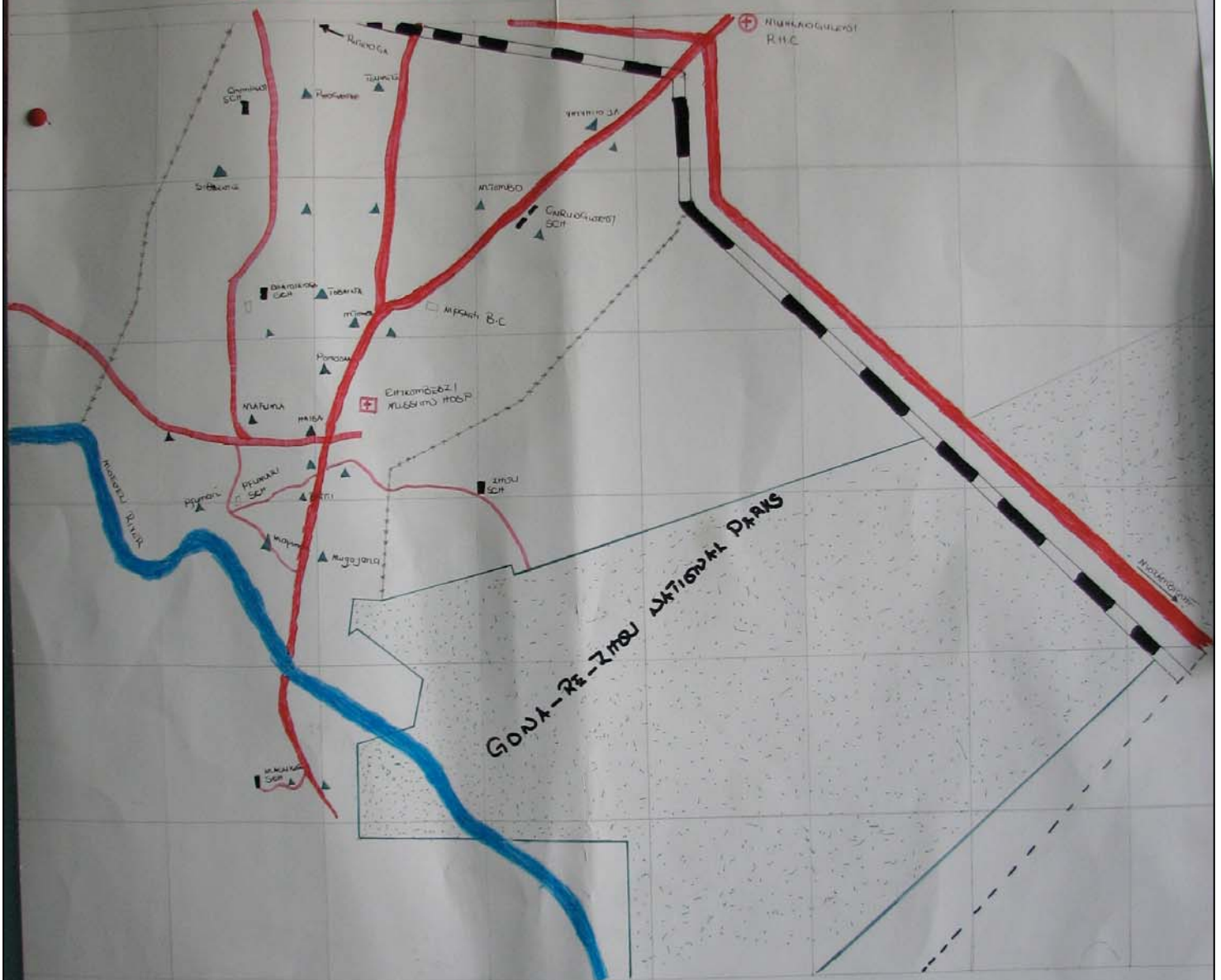


ADDRESSES OF INTEREST IN TB COORDINATION	PREVENT DIARRHOEA	IS IT TUBERCULOSIS?
1. DEHO CHIKOMBEZI BAG 551	- Build and use latrines.	- Register the patient,
2. DEHO MWENZEZI P.A. NESHURO MENZEZI	- Wash hands with soap and water after and before eating.	- Notify each patient,
3. DEHO CUTU BOX 136 CUTU	- Keep flies away from food.	- Trace all contacts,
4. DEHO BIKITA BOX 180 N BIKITA	- Boil all unsafe water.	- Give health education,
5. DEHO LARA BOX 1052 LARA		- Discharge and transfer to R.H.C,
6. MORINGO HOSPITAL BOX 11 MORINGO		- Review and supply drugs monthly,
7. MORGESTER HOSPITAL P.O. MORGESTER MORGESTER		- Refer to doctor,
8. MORGESTER HOSPITAL P.O. MORGESTER MORGESTER		- Fill Outcome Report.

CHIKOMBEDZI MISSION HOSPITAL

2004

DISEASE SURVEILLANCE



KEY

*	MEXASLES
✓	POLIO
∩	TETANUS
○	DROWNA
⊥	DISENTRY

⊕	HOSPITAL
□	SCHOOL
▲	VILLAGE
⊢	RAILWAY LINE
—	ROAD
~	RIVER
▨	NATIONAL PARK

Disease Surveillance Map, Chikombedzi Hospital, Zimbabwe, March 2009

This hand-drawn map is on the wall of a ward Matron's office in Chikombedzi Hospital. It clearly shows the relationship and proximity of the hospital, clinics and villages to Gonarezhou National Park, and includes information on some of the diseases found in the area.

(Photograph by C. Geoghegan)

4. Next Steps, Interviews, Student Support and Results

With the questionnaire development and study site selections completed, we are pleased to report that the project is now ready for the next steps, including fieldwork, data collection and questionnaire analysis. However, despite efforts by this group and our collaborating partners, we have faced difficulties finding students to undertake this work.

The goals of this project are not only to collect the data as described above, but to contribute to the education of local students in each of the GLTFCA countries, through their inclusion in the project's design, implementation and data analysis. This commitment to building local capacity has resulted in a lengthy search for suitable candidates to conduct the questionnaires in each area, which has been hampered by conditions outside our control. These include an unforeseen and dramatic increase in the fees for Zimbabwean students, resulting in a loss of students at Master's level for the 2009 / 2010 academic years. Similarly, due to the short duration of this project, it has been difficult to obtain students who require a longer fieldwork component for their degrees (Master's and PhD), and those who have only a short period to complete and submit their thesis (Honours level).

Although it has taken time to rectify these problems, we are pleased that field data collection is scheduled to start in July. This extra time has provided us with the opportunity to collaborate with new and exciting groups that we met at the 2009 *AHEAD* GLTFCA Working Group Meeting in Mozambique, which may provide further study areas within the GLTFCA over the coming months. We have also been able to develop the electronic database, which we will use to enhance data entry and minimise error once the questionnaires are ready for analysis. As a result, the dissemination of results to communities and stakeholders, outlined as a priority for this project, will be completed over a shorter duration than initially expected.

We remain excited to be undertaking this project, and grateful to the WCS *AHEAD* GLTFCA Seed Grant Program for their support. We expect that the remaining activities scheduled for this project will be completed within the duration of the Seed Grant, ready for inclusion in the 2010 *AHEAD* GLTFCA Working Group Meeting.



Ladies at Chikombedzi, Zimbabwe, March 2009 (C. Geoghegan)

