

# EARTHWATCH INSTITUTE ANNUAL FIELD REPORT

**Project title: Studies of Indigenous Knowledge on Medicinal Plants and Conservation among the Samburu in Northern Kenya**

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**Period covered by this report: march : 2006 to Dec. 2008**

To all our esteemed volunteers,

It was wonderful working with you. For those volunteers who worked with us in the Ngare Ndare Forest, the rain forest was thick, with wild animals larking at every corner, especially the Black Rhino and the Buffalos. A threat of herds of elephants was ever present with broken trees on each side as we moved forward against old and fresh elephant dung in search of holders of indigenous knowledge and actual medicinal plants. Your determination and resilience was invaluable.

In the Suboiga, Kisima, Mbuju and Ethi areas we came across difficult cultural situations but volunteers managed to adapt to the changing conditions rapidly and effectively. Without your malleable attitude it would have been difficult to accomplish our tasks. For the volunteers who worked with us at Wamba, the locality was a more challenging environment. The area is generally dry (semi-arid) with very limited rain and when it rains, Samburu is full of laggars. Our team greatly appreciates all the efforts that were made in this connection to enable us accomplish set objectives.

Through the help of volunteers, we were able to hold 219 interviews with 76 traditional medical practitioners who gave us names of 58 plants species used for the treatment of various illnesses in different communities of Laikipia and Samburu. Several of the practitioners used common plant species for the treatment of common diseases in different communities and the methods of harvesting the plants were identified mainly as destructive and unsustainable. Several of the plants had different names in the diverse localities but when samples were collected for identification were found to the same species.

We appreciate immense effort by volunteers who tirelessly entered the field information in the database every evening at the camps. We also appreciate subsequent identified threats to the plant species and areas where conservation efforts will be focused.

Finally identified plants species were crushed or chopped into smaller pieces and dried then soaked in a variety of organic solvents for purposes of dislodging active organic principles which were subsequently tested *in-vitro* against known pathogenic bacteria. Several professional volunteers' such as pharmacists and doctors joined in the exercise for *in-vitro* evaluation of antimicrobial efficacy. For all the volunteers who contributed in many ways outlined above, our team says thank you and welcome back.

## Reporting on research objectives

### **Objective 1: Collection of indigenous knowledge on traditional medicinal plant use and conservation among Samburu.**

Using questionnaires and with the help of volunteers, the first objective was extensively addressed. The information covered several localities of Laikipia and Samburu Districts of Kenya involving diverse cultures and practices. Our research group considered prudent to address this objective simultaneously with objective 2, 4 and 6 as will be reported appropriately under each objective.

Under this objective 219 interviews were held with 76 traditional medical practitioners. From each of the practitioners, specific information relating to the diseases treated by each plant or group of plants was obtained, parts of the plant used type of the plant and how the plant is harvested. The interviews further required respondents to explain if there is any control on the harvesting process, where the plants used to be found, where they are found now and the relative availability.

Information received from each of the practitioner was synthesized and after each interview they were requested to accompany our team to the field to show us each of the plants mentioned at the interview if the plants were available during the particular season. The floral parts of each of the plant were picked, pressed and preserved for identification and herbarium storage. The rest of the plant was harvested the same way the practitioners harvested them, extracted with water and organic solvents and used to address objective 6- "To evaluate the efficacy of traditional medicinal remedies". Through this process, 58 plant species used by the Samburu for the treatment of various illnesses have been identified.

### **Objective 2: To develop a database for medicinal plants in the Samburu-Laikipia landscape area.**

Each time the research group went to the field with volunteers, information was entered into data sheets but at the same time volunteers were provided with writing pads to record any other relevant information not covered in the datasheets. With this kind of strategy, all relevant information would be captured for synthesis and vetting.

Volunteers have hitherto done a commendable job because after each field trip, the information has been keyed into our laptops. What is required now is to collate the information and come up with a sensible database. Many of the plants used by the various clans and the language groups among the Samburu are similar or very slightly different. Some of the plants have different names among the language groups but the scientific names turn out to be same once the plant is identified.

The collating of information on laptops has **NOT** been done so that a database is established according to **OUR OBJECTIVE 2.**

### **Objective 3: To determine the abundance and distribution of medicinal plants and**

### **assess species status.**

Work has not commenced on this objective. The objective is supposed to be addressed in 2009.

### **Objective 4: To establish harvesting impacts and causes of threats to medicinal plants.**

This objective was addressed at the same time as objective 1 where the questionnaires addressed issues related to part of the plants that were used. Very often respondents said the plant roots were used and the method of harvesting involved the uprooting of whole plants, which is a potential threat to the plant species.

Sometimes the stem bark is used and the respondents indicated that nobody regulated how the stem bark was harvested or how much was taken and this was also a potential threat to the plant. Debarking could be seen in the field with several plants drying up because of excessive debarking. However, debarking was also done by wild animals especially in Laikipia where animals use the same plants as humans for deworming and other illness and this was identified as a conservation threat.

Changing plant habitats were noted. For example, plants that in the past could be found along laggars within reach of most communities had moved to the hills and mountains. Perhaps this is due to the changing weather patterns, excessive destructive harvesting or both. It is important at this point to note that this data is already collected and entered in the database. Synthesis will be done and conservation mechanisms initiated.

### **Objective 5. To determine spatial and temporal scale of marketing and economic value of medicinal plants.**

Data collection on this objective started with team 10, essentially because of political problems in Kenya at the beginning of the year. The problems caused team dates to be moved to the later part of the year when Samburu (the study site) is very dry and there were no plants to see or collect. It became necessary to adjust the programme and interview medicinal plant product traders on marketing patterns and extend.

Part of the data has been collected so far. Interviews have given information on various essential issues on how traders got into the business, how they obtain their stock, frequency of restocking, names of plants and ailments the plants treat, number of customers attended to in a day, week or month. They were able to point out limitations to their businesses, how they determine doses of the concoctions and how they determine prices for each product. The information collected through this marketing questionnaire will help in determining sustainable harvesting practices driven by need and stimulate conservation mechanisms that will be cost effective. The marketing questionnaire will be continued even in 2009.

### **Objective 6. To validate the efficacy of traditional medicinal remedies.**

Medicinal plants are used among the Samburu according to experience and information passed from elders through generations. Even with plenty of available information and experience many of the plant products still cause toxicity and death. It is because of the need

to determine the quantities needed to kill the various pathogenic micro-organisms that this objective was conceptualized.

Thirty two (32) plant species have been extracted and tested for antibacterial and anti-fungal properties. Out of the 58 plant species there are twenty six (26) remaining to be tested. There will be need to test specific plant species for anti-malarial properties and also do some physiological tests such as anti-inflammatory and anti-spasmodic tests.

Progress on this objective is therefore very good. A paper has been drafted from the findings on this objective and submitted to a journal "Pharmacognosy Reviews". As soon as the response is received from the editor, the information will be relayed to the Kenya Country Director. At the same time two Masters theses have been written. One has been submitted to the Graduate school at Kenyatta University in Kenya but the other is still in draft form. Copies of the theses will be deposited with the Earthwatch office of the Kenya country Director as soon as the students (Eric Omori Omwenga and Julius Kibii Kirui) graduate.

#### **Objective 7. To establish the active principals of selected medicinal Plants.**

This objective has not been addressed.

#### **Objective 8. To explore avenues for sustainable use and management of medicinal plants.**

This objective has not been addressed

## **Project development**

### **Scientific Challenges**

Seasonal variations and climate change were a challenge. Many of the medicinal plants are often plentiful in April and may. This is the time when some of the most representative floral samples can be seen and picked. At the same time September to December also have the short rains that make the vegetation blossom. These seasons have changed slightly and sometimes it has become difficult to predict the seasons. In the next field season, some team choices will be shifted to periods when the rains are expected.

## **Non-technical summary of results**

### **Account of the data collected and results**

The "Ma" communities of Kenya live in the study area covered by the proposal from the Laikipia District in northern Kenyan to the Mathews Ranges that neighbour Wamba town, where the Samburu live. Data on indigenous knowledge on medicinal plants was collected from these communities because they are marginalized by the Kenya government; they are nomadic and live in a harsh environment where the only mode of healthcare is by use of medicinal plants. There are no hospitals within the communities, and where hospitals exist like the Wamba mission hospital in Wamba town, the natives don't trust the facilities and those who do, have no money and cannot meet medicare costs. The Samburu therefore depend almost entirely on self medication using medicinal plants. They have very rich knowledge of

these medicinal plants which was captured by the interviews contacted.

From the data collected, 219 interviews were conducted using 76 knowledgeable elders who assisted in the collections of 347 samples. From the samples collected, it became apparent that several samples were similar and therefore of the same plant species. Sometimes the different “Ma” language groups had different pronunciations for a plant which turned out to be the same as the one that had been collected before. In total then, only 58 medicinal plant species could be identified from all the samples collected from the information given. The majority of plants were of *Acacia sp.* since Samburu is semi-arid and only plants that don't need a lot of water can survive in the region. The others were *Cordia sp.*, *Aloe sp.*, *Albizia sp.*, *Boscia sp.*, *Cissus sp.*, *Croton sp.*, *Euphorbia sp.* and *Balanites sp.* to name but a few

For the majority of the plants the parts harvested were roots/root bark, stem bark, whole plants, leaves and plant sap. Harvesting methods were destructive and non-sustainable. Several of the plants were therefore no-longer in their original habitat and medicine men were beginning to move to distant places to find plants that had been readily available and in the neighbourhood a few years ago

Generally the new habitats mentioned seemed to be the hills or mountains or some neighbouring locality with more moisture precipitation than native localities. Destructive or non-sustainable harvesting appears therefore to be a threat to the plant species.

Diseases frequently mentioned as managed using medicinal plants were stomach problems, including diarrhea, deworming, cough, malaria, wounds, oral thrush, skin diseases, yellow fever, polio, eye problems, expulsion of placenta and barrenness. There were a few interviews where it was claimed they also treat anthrax and tuberculosis. When plant samples were extracted and tested against micro-organisms known to cause the diseases named above, many of the plants were found effective. They were effective on the organism causing malaria, typhoid, wound infection and even the one causing cystic fibrosis. A paper to this effect has been drafted and submitted to a journal. The specific names of the plants known to be effective on the organisms causing each disease will not be disclosed in order to protect community resources. Tests in future will be performed on '*mycobacterium*' (the organism that causes tuberculosis) since many strains that were not causing tuberculosis are now pathogenic, sometimes with multiple-drug resistance or super drug resistance.

### **How results contribute to achieving conservation impacts**

Results obtained have identified threats on the medicinal plants. There is definitely destructive and non-sustainable harvesting of these plant species. The practice should be stopped through education. The type of education given must involve initiation of projects for replacement of destroyed plants and boosting of plant population through introduction of seedlings of the valuable plants. This can be done through seeds, cuttings or even through tissue culture.

The education given to the community should involve results obtained from marketing interviews where the community can boost economic earnings through sales of the increased medicinal plant products. This concept will act as an incentive for the conservation project and will be in line with the current Kenya government act which allows medicinal plant preparations

to be given to patients in conventional hospital settings. In addition, results obtained have identified the most effective medicinal plant species that need to be given a lot of urgent attention to avoid extinction from either destructive harvesting or climate change. Some of the plant species identified are rare and only grow in the arid or semi-arid regions. However with the arid and semi-arid habitats becoming less habitable, the species could be lost to mankind.

### **Significance/Benefits of Research at the following levels:**

#### **(a) Local (to the area of the research site)**

The research has captured indigenous knowledge on medicinal plants of the “Ma” speaking community of Laikipia and Samburu Districts of Kenya. This can now be stored in a database where it can be retrieved as need arises. Plans are also underway to write a book entitled “Medicinal Plants of the Samburu”. In addition to the above, a few workshop sessions have already been held for dissemination and interpretation of results to the community. It is hoped such sessions will help the community understand the importance of their medicinal plants and why they should be conserved.

#### **(b) National/Regional**

In line with the National goal for the utilization of medicinal plants in the treatment of diseases in conventional hospitals, the research will enhance activities at the national level. In addition, two masters students have been trained in principles of identification of environment resource conservation.

#### **(c) International**

With one manuscript already submitted to an international journal, the work has contributed to knowledge on the medicinal plants and our expectations from the resource. Perhaps the work on Tuberculosis might have a bigger international impact.

## **Communication of results**

### **Printed**

#### **(a) Students**

Mr. Omori Eric Omwenga (a student at Kenyatta University) has submitted an Msc. Dissertation entitled “The Efficacy of Selected Medicinal Plants used to Treat Diarrheal Diseases by the Samburu Community”, and Mr. Julius Kibii Kirui (a student at the same University) is drafting another thesis entitled “The impact of Samburu commonly used medicinal plants on disinfection of portable water”. In both documents Earthwatch is acknowledged for financial support. Copies of the theses will be deposited with the Kenya country director as soon as the students graduate.

#### **(b) Meetings and conferences**

A workshop was held with stakeholders (the community) on the information gathered on

indigenous knowledge. In the workshop, the various threats to continued exploitation of plant resources as identified by the research team were discussed. Scientific evaluation of determined efficacy of most of the plants were simplified and presented to the community.

## **Educational Opportunities**

### **Groups involved in the project**

- ◆ Local communities
- ◆ Students
- ◆ Early career scientists

### **How project helps the group understand conservation**

#### ◆ **Local communities**

As information was received from stakeholders, the research team and volunteers requested to know where the plants were found and then visited the site for identification of the mentioned plants. On several occasions such plant could not be found or were found destructively harvested and dry. Such findings forced the team to move to distant places to find the samples of the plant and when the workshops were held it was not difficult to help the community appreciate the need for sustainable harvesting and conservation of the plants.

#### ◆ **Students**

In the year 2007, the project was able to host a student from Kenya Polytechnic who was on attachment. The exposure gave the student an opportunity to appreciate the need for environmental conservation.

#### ◆ **Early career scientists**

Two early career scientists were trained while a third from the Kenya polytechnic was given exposure.

### **Completion of Masters theses**

Two students have completed masters theses

- (i) Mr. Omori Eric Omwenga who has already submitted the thesis.
- (ii) Mr. Julius Kibii Kirui is still drafting the thesis

## **Acknowledgements**

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way to come and be with us even under the difficult conditions pertaining in semi-arid areas such as Laikipia and Wamba Districts. To all the elders in Laikipia and Samburu. They are too numerous to thank individually but we wish to pass our gratitude to them all. And finally we wish to thank Kenyatta University for allowing us time from our busy teaching schedules to go to Laikipia and Samburu for the research.