Biovision

Newsletter June 2020

Malaria quelled

A sigh of relief for the people of Malindi

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A future for all, naturally

Dr. Lydiah Kibe
Project Manager, Malindi, Kenya

"I am very proud of the results of the 'Stop Malaria' project! It was a long journey."

Biovision malaria projects

Integrated prevention of malaria and animal diseases has been tested since 2019 in the follow-up project to "Stop Malaria".

- **Objectives of the current project phase:**
  - Adapt organic insecticides for use on cows
  - Involve the local population and authorities early in developing the method
  - Evaluate organic insecticides and application methods in field trials
- **Impact of the "Stop Malaria" project in Malindi 2005–2018:**
  - Approximately 75% fewer disease-transmitting mosquitoes
  - A reduction of the incidence of malaria in the population from approximately 40% to 3–5%
- **Project budget 2020:** CHF 289,700

Malaria and us:
Temperatures are rising worldwide as a result of climate change. This encourages the spread of pathogens and vectors – even in our own country.

What we can do:
Live sustainably with low CO_2 emission habits in consumption, housing and mobility (seasonal, regional, ecological and energy-efficient).

Malaria quelled

Before Covid-19, major outbreaks of infectious diseases in Europe seemed to have been defeated. But in East Africa, infections are a constant danger. In flood-prone Malindi, Kenya, the high incidence of malaria has been significantly reduced – a great relief, especially now in the time of corona.

Text and images by Peter Lüthi, Biovision

The floodwaters from the Sabaki River came without warning. "All we could do was grab our children and their grandmother and get ourselves to safety on Mbogolo Hill," says Kazungu Masha Weni, a 53-year-old farmer and father from M'mangani Village. The flood took everything with it: houses, household goods, cattle and chickens. Another 400 families in the village faced the same fate.

But it could have been much worse. In the past, many victims fell to malaria epidemics that followed the floods and rainy seasons. This time the people in in the Malindi Subcounty were spared that misfortune. This was partly thanks to the preventive measures implemented in recent years and supported by Biovision.

Malarial mosquitoes targeted

Malaria pathogens are transmitted by mosquitoes. The "Stop Malaria" project succeeded in significantly decimating the mosquitoes through a series of coordinated and environmentally-friendly measures (see pages 4 and 5). The fewer mosquitoes carrying the disease, the lower the risk of infection for people. One of the keys to the success of the project was the collaboration of scientists from the state-run Kenya Medical Research Institute (KEMRI) with the International Centre of Insect Physiology and Ecology *(icipe)* based in Nairobi, Kenya, the regional health and environmental authorities, and the workers referred to as "Mosquito Scouts" from the local NGO PUMMA (see page 8). Together, they succeeded in significantly reducing disease transmission.

Danger averted

"We've been living here in M'mangani for more than thirty years," says Janet Weni, Kazungu's wife. "There used to be so many mosquitoes that we could never eat outside in the evening without being eaten up ourselves." At that time, there were about 200 cases of malaria in her village alone from March to June every year. She, her husband and several of their children were also seriously ill several times. "Today I only get bitten once or twice a night," she says, "There are now only a few cases of malaria in M'mangani."

The person responsible for the small clinic in the village confirms her statement. "Malaria is not a big problem here anymore," says Catherine Kachibi Kaingu as she opens her report book and calculates: "In the last malaria season we did not have a single case in March, only one in April, three in May, nine in June and three in July."

Viral diseases also decreasing

Dr. Lydiah Kibe, the long-time project manager in Malindi, is very proud of the success of "Stop Malaria". She stresses that environmentally-friendly mosquito control is not a short-term issue. "Our project was a long journey." And she points out a very welcome additional effect: "The measures are also effective against viral diseases transmitted by mosquitoes. In the project area, the cases of yellow fever, dengue, chikungunya and elephantiasis have declined noticeably."

Now the people in Malindi are also facing the Covid-19 pandemic. At least they are largely spared from malaria.

www.biovision.ch/malaria-en

1 View of Mbogolo Hill, where Janet and Kazungu Masha Weni and their family fled the floodwaters.

2 Mosquito Scout Amos Wangi takes a sample from a water hole at M'mangani Village to check for mosquito larvae. While doing so, he explains the origin of malaria to children.

3 Malarial mosquitoes lay their eggs in stagnant water. Puddles, tree hollows, worn-out car tyres and even pieces of plastic trash are ideal breeding grounds that must be eliminated or monitored.

4 *Bti (Bacillus thuringiensis israelensis)* is used to control mosquito larvae in larger bodies of water. Mosquito larvae eat kernels that contain the bacteria. The bacilli release toxins into the insects' intestinal tract, killing the larvae.

We need political will

The holistic approach of Integrated Vector Management (IVM) works for malaria control. This was clearly shown by the "Stop Malaria" project supported by Biovision since 2005. When the project began, about 40 % of people in the Malindi Subcounty were infected with malaria. Today, this prevalence is only about 3–5 %. Similarly, mosquito populations were reduced by about 75 % – these numbers speak for themselves!

Integrated Vector Management also has a positive effect on viral diseases that are transmitted by mosquitoes, for example dengue, yellow fever, chikungunya and elephantiasis. These infections have also declined in the project area, which is encouraging.

Now it is time for decision-makers at county and national level to adopt the IVM strategy for malaria control and allocate the necessary resources. However, this is very hard to achieve. There are still potent at work, seeking to discredit the idea of tedious multi-stakeholder collaboration and community participation and instead promoting individual interventions with synthetic insecticides. The science clearly shows the added value of IVM. We now need to bring these results to the policymakers to obtain the political will necessary for such an integrated approach.

Professor Charles Mbogo
"Stop Malaria" project coordinator at the Kenyan Medical Research Institute (KEMRI)

The end is near

Malaria, just like many other infectious diseases, is transmitted by bloodsucking insects. A holistic approach can control these diseases and greatly reduce their incidence, as shown by the "Stop Malaria" project.

By Simon Gottwalt, Biovision

Do you know what is the most dangerous animal in the world? Is it a poisonous snake, a great white shark or a grizzly? Far from it: mosquitoes kill more than half a million people every year by transmitting dangerous diseases, most of all malaria.

This is why combating malarial mosquitoes is a high priority for the international community. Often, attempts are made to encourage individual measures, such as using impregnated bed nets or spraying insecticides as thoroughly as possible. These approaches have saved many lives: worldwide, the death rate has fallen by 60 % since the turn of the millennium, and 20 countries have been able to eliminate the disease completely. With the increasing resistance of mosquitoes, however, these individual measures are reaching their limits. New instruments and an integrated approach are needed to achieve the planned eradication of malaria in the remaining 86 countries of the world.

Biovision relies on a holistic, holistic method known as Integrated Vector Management (IVM), which combines multiple measures for mosquito control (see box). The long-standing "Stop Malaria" project implemented these measures at three locations in Kenya and Ethiopia. The local partner organizations, the International Centre of Insect Physiology and Ecology *(icipe)* and the Kenya Medical Research Institute (KEMRI) supervised the project on site. Ultimately, our aim was to prove scientifically that IVM works. But does it really?

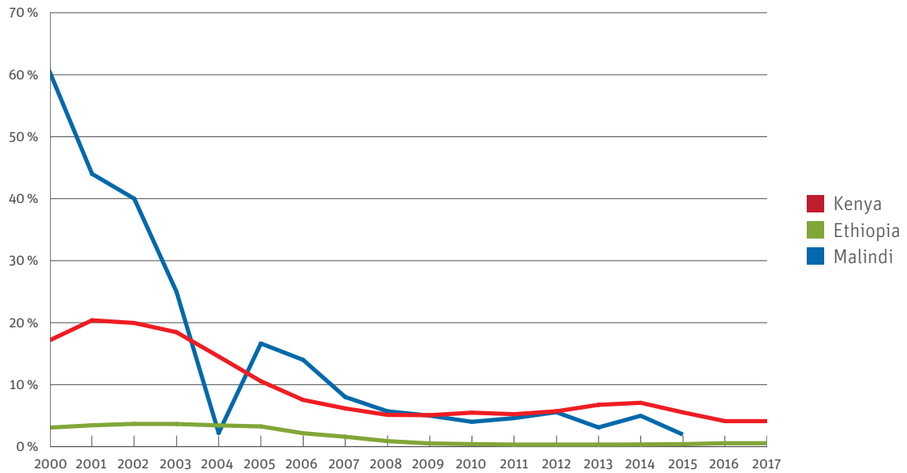
Adapting IVM measures to each location
"It depends on the conditions at the specific location," says Professor Charles Mbogo, project manager at KEMRI. "In Malindi, we have seen an impressive decrease in malaria cases over the course of the project." But the number of cases has also fallen elsewhere (see figure). Therefore, randomized controlled trials (RCT) were needed to assess the method's effectiveness. The result: IVM, and in particular larval control through environmentally-friendly *Bti (Bacillus thuringiensis israelensis)*, works best in high-density populations at a manageable number of breeding sites. This is the context in and around Malindi, where malaria has been largely reduced. In areas that remain highly infested such as Nyabondo on Lake Victoria, the second project site in Kenya, larval control was less effective. There, sealing houses to prevent mosquitoes from entering proved to be an effective measure.

IVM is expanding its reach
These findings are important for further targeting IVM promotion at political level (see commentary). Kenya and Tanzaniahave already achieved initial success: national governments are financing larvae control in larger areas. The experience gained there, as well as manuals and school curricula from the Biovision projects, are now proving to be very helpful. Biovision is also helping the governments of Namibia and Uganda to develop and implement national roadmaps for IVM measures through the UN Environment Programme.

Further developing IVM
The long-standing model project "Stop Malaria" ended in 2019, but local structures such as the PUMMA Mosquito Scouts Association (page 8) remain in place. The IVM concept will be consistently used by Biovision and *icipe* in the new project "Innovative disease prevention in animals and humans". In this project, a new method will be added to the IVM toolbox. Whereas our measures have so far concentrated on malaria control and hence on humans, cattle are now also being included in the project scope. By adopting an integrated approach, the expanded method will kill two birds with one stone, as it were. Cows that serve as bait to blood-sucking Anopheles mosquitoes will be sprayed with a bio-insecticide, thus eliminating the Anopheles mosquitoes and reducing the entire mosquito population. Other parasitic bloodsuckers that spread dangerous animal diseases, such as tsetse flies and ticks, will be decimated in the process. The project is still in its early stages. As it is being developed, people in the affected communities will be closely involved so that the method can be adapted to their needs.

Danger from the coronavirus
A large field trial was intended to be started this year to check whether the new method would bring the expected synergies. It will take some time before the disease is eradicated, but the end is in sight. Malaria could be defeated outside of Africa by 2030. Experts believe global eradication is possible by 2050. But East Africa is currently facing a new challenge: the coronavirus pandemic has reached the continent. There is growing concern that the lockdown will also affect malaria treatment and thus cause much greater damage than the coronavirus itself. Ultimately, sustainably preventing pre-existing and familiar diseases should be more important now than ever.

Development of malaria incidences (prevalence)



In the project area in Malindi, Malaria has been significantly reduced from over 40 % before the project started to 3–5 %. National data shows that the disease has been eradicated throughout Kenya and Ethiopia, the second country covered by the Biovision project, thanks to extensive international efforts.

Simon Gottwalt
Molecular biologist, responsible for Biovision's human and animal health projects

Integrated Vector Management (IVM)

IVM is a holistic approach, a kind of toolbox for controlling disease-transmitting insects (vectors). It comprises a series of coordinated measures to prevent malaria transmission by:

- Controlling mosquitoes in various ways, e.g. by eliminating breeding waters or by treating them with *Bti* or other biological insecticides
- Monitoring the number of mosquitoes and pathogens
- Informing the population about the origin of the disease, explaining how to eliminate breeding waters and how to use bed nets consistently
- Incorporating the control of insects that transmit other diseases
- Cooperating with other sectors (e.g. veterinarians or irrigation projects)

“One Health”

In the Ethiopian Somali region, pastoralists and their animals are threatened by climate change and dangerous infectious diseases. Malnutrition and poverty are the result. The project (see article, right) is part of a larger “One Health” initiative. “One Health” stands for a holistic approach to promoting the health of people and animals, since diseases are often transmitted between both.

The SARS-CoV-2 coronavirus that is currently rampant was also initially transmitted from animals to humans in China. To improve human health, the health of animals and the environment must also be promoted.

www.biovision.ch/one-health-en

Mutual transmission of disease is frequent in the Ethiopian Somali region due to a lack of knowledge among the population and the close coexistence of people and livestock.

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The new diagnostic device in the laboratory at Jigjiga University in the Somali region can detect various diseases, including Covid-19.

Additional coronavirus tests in Ethiopia

In a joint project conducted by Swiss TPH, Jigjiga University, the Armauer Hansen Research Institute (AHRI) and Biovision, a laboratory for the detection of new coronaviruses was set up at short notice. For Ethiopia, with its modest testing capacities, this is an important step in the fight against the pandemic.

By Peter Lüthi, Biovision

The request from the government of the Somali region in Ethiopia for a diagnosis of the coronavirus SARS-CoV-2 came on 24 March. Just three weeks later, the first swabs had already undergone tests – which were luckily all negative. Unfortunately, the situation has changed in the meantime. At the time of going to press (19 May), 50 cases of the coronavirus had been detected, and the numbers are rising. This makes the laboratory’s additional testing capacities all the more important.

“The machine can easily handle 100 tests a day,” says Prof. Dr. Jakob Zinsstag from the Swiss Tropical and Public Health Institute (Swiss TPH), which is implementing the project supported by Biovision and the Swiss Agency for Development and Cooperation SDC, together with Jigjiga University and AHRI. “Biovision’s contribution is invaluable,” explains Zinsstag. “It has enabled us to train local experts and procure reagents for detecting coronaviruses.”

Controlling diseases and pastureland

The new laboratory is part of the project “Information system for diseases and drought”. It was built for the early detection of diseases in animals and humans. Infections that are transmitted from animals to humans, known as zoonoses, are of particular interest. Rift valley fever, Q fever, brucellosis and anthrax are very common among pastoralists in the Somali region. This is due to the close coexistence of humans and animals as well as a lack of understanding about what causes the diseases. Because of this, the project places great importance on disseminating knowledge among the population and promoting changes in animal husbandry practices.

Jointly monitoring animal and human diseases should enable the authorities to detect outbreaks earlier so they can take appropriate measures. An information system for pasture land will also be integrated. In the event of drought, the herders and their herds should be organized in such a way that the limited grazing land can be used as efficiently as possible and without conflict.

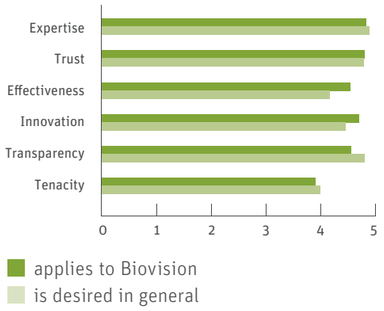
Is Biovision needed?

In November we asked our donors to participate in a survey conducted in association with master students from the Zurich University of Applied Sciences ZHAW. Over 1,200 people responded.

By Sabrina Nepozitek, Biovision

Those surveyed were generally very satisfied with Biovision, giving us an overall grade of 4.7 out of 5 (5 = very good, 1 = very bad) in praise of our work. We also received particularly good marks for expertise, innovation and impact. According to the answers, we have potential for improvement specifically in terms of transparency. On our website you can find our annual and audit reports to gain a deeper insight into our foundation’s activities.

Requirements for non-profit organizations and achievement of Biovision goals



We are dependent on your support in order to help people in East Africa to help themselves. Will Biovision still be needed in 20 years? Over 900 donors answered with a yes. We sincerely thank all participants for the time they took to give us feedback.

Additional results:
www.biovision.ch/survey

East Africa is currently suffering from one of the worst locust plagues in the last 25 years.

Poison against locusts?

Large-scale use of insecticides is the most common measure used to combat the worst plague of locusts in East Africa in the last 25 years. However, the chemicals are also a danger to humans and the environment. What are the possible alternatives, and what would be needed to promote them more?

By Martin Grossenbacher, Biovision

The coronavirus is not the only plague East Africa is fighting: the rural population is also suffering from the worst locust plague in the last 25 years. Billions of locusts are destroying the crops across huge expanses of land. Insecticides are the primary method used to control these voracious pests. The chemicals are sprayed from aircraft or off-road vehicles over large areas – with devastating side effects. The poison also harms people, pollutes water and kills important beneficial insects such as bees.

Protecting people and the environment

Our partner organization *icipe*, the International Centre of Insect Physiology and Ecology in Nairobi, is part of Kenya’s national task force and is at the forefront of research into environmentally-friendly alternatives. Dr. Sunday Ekesi, head of research at *icipe*, explains their integrated approach to Biovision: “The most successful method consists of early detection of swarm formations combined with the targeted use of biopesticides, messenger substances (e.g. sexual attractants) and low-dose insecticides in the relevant areas.”

Redirecting research funds

The research and development of ecological methods against locust infestations has remained in its infancy for decades. The reason: not enough money. Our recently published study on the funding of agricultural research shows just how great the need for action is. When it comes to research into the agriculture of the future, mammoth amounts of money continue to flow into purely technological solutions that rely on chemical fertilizer and pesticide use. Biovision is therefore actively working to ensure that more funds are rapidly channelled into research into agroecology.

Study in English:
www.biovision.ch/agr-study

From the life of Riziki Ramadhan, mosquito scout in Malindi, Kenya

Heroes and heroines of everyday life

By Peter Lüthi, Biovision project reporter

Riziki Ramadhan from Malindi is an everyday heroine, like all her colleagues from the local NGO PUMMA. They are "Mosquito Scouts" who have made a significant contribution to ensuring that the people in the region have been largely freed from the scourge of malaria (see pages 2 and 4). Mosquito Scouts educate the population about the causes of and protection against malaria and ensure the implementation of environmentally-friendly measures to control the disease-transmitting mosquitoes. Each scout is responsible for an area of one square kilometre. There, they identify potential breeding grounds for malarial mosquitoes on weekly patrols. They take water samples to check for mosquito larvae. Breeding site locations and the number of larvae are recorded in detail and the information is passed on to the insect specialists at the Kenya Medical Research Institute (KEMRI). By pooling these details with the data on disease cases provided by the health authorities, KEMRI researchers can monitor the occurrence of mosquitoes and the spread of the disease.

Riziki Ramadhani found mosquito larvae in a cistern in Malindi Town. Since then, the owner has consistently covered the well in her garden. The water is regularly treated by specialists with environmentally-friendly *Bti (Bacillus thuringiensis israelensis)* that is then consumed by the mosquito larvae. The bacilli destroy the insects' intestinal tracts, causing them to die. *Bti* specifically targets malarial mosquitoes but is harmless to other organisms. The distribution and correct, consistent use of bed nets has also been crucial for the decline of malaria in the Malindi Subcounty. Resistance was initially high. "Many people refused to sleep under the white nets because they look very similar to the cloths used to cover the dead here," explains Riziki. "It took a lot of patience and persuasion to overcome the resistance." The breakthrough finally came when the scouts received blue or green nets to hand out. Thanks to their extensive knowledge and the noticeable decrease in both mosquitoes and malaria, they were able to gain the respect and trust of the people. "Today they call me Mosquito Doctor," smiles Riziki Ramadhan proudly.

> "Today they call me Mosquito Doctor."

The scouts work on a voluntary basis in return for an expense allowance, even though they do not live in otherwise rosy conditions. Riziki Ramadhan, for example, kept her children and her unemployed husband afloat by making and selling baked goods on the streets. Today, her broad experience in dealing with the population also helps her get paid work. For example, she is temporarily employed by other NGOs and the authorities to work on campaigns to raise awareness about HIV/AIDS and tuberculosis and for reducing domestic violence.

www.biovision.ch/scout-en