



Dambari
Wildlife Trust

REPORT ON THE FIFTH YEAR OF THE MATOBO BIODIVERSITY MONITORING PROJECT.



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Dambari Wildlife Trust
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Donation of educational materials

Wildlife and Environment Zimbabwe
Mother Africa Trust
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Directory Publishers
Rob S. Burrett and Paul Hubbard

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The Matobo Biodiversity Monitoring Team in 2016

Field Education Officer Cedric Maforimbo coordinated the project with assistance from a Relief Field Education Officer, Bright Sagonda, in the 2nd school term. Assistance was also received from Curators, Curatorial and Technical Assistants from the Natural History Museum of Zimbabwe (NHMZ). This team comprised Kudzai Mafuwe, Wallace Majaya, George Malunga (Entomology department), Kudzanai Dhliwayo and Lovemore Temba (Ornithology department). Museum staff assisted with bird and insect identification, as well as with demonstrations of the use of field equipment, specimen presentation and display techniques. Sydney Dube, a recent graduate, volunteered on the programme for several months, assisting with material production, school visits, and data entry. In a bid to build the capacity of Zimbabwe’s future conservation professionals, we included on the team local university students who were carrying out their industrial attachment module at Dambari Wildlife Trust (Prince Gudoshava, Elson Macheke [2015/16 cohort] as well as Novisi Gbenou, Leeroy Moyo and Jacqueline Chigunwe [2016/17 cohort] and at NHMZ (Sibusisiwe Moyo) throughout the year.

Recruitment and Membership

On our first visit to each school in January 2016, we delivered an introductory talk to the target group for recruitment (Form 3s, 3rd year of secondary school). Pupils who felt that they would be interested in joining the club were then signed up. Most members remain in the club into their Form 4 year, leaving only to prepare for their major Ordinary Level public examinations in July.

As at the end of 2016, 69% of pupils who opted to join the club at the beginning of the year were still regular members who attended at least 50% of club meetings (Fig. 1). This cohort of club members will still be part of the programme for the first two school terms of 2017. The percentage of recruits who were still regular members at the end of 2016 exhibited an improvement as compared to those who were still regulars at the end of 2014 (59% of recruits) and 2015 (45% of recruits).



Figure 1: Trends in club membership from 2014 to 2016. Club registers were not kept in 2012 and 2013.

We visited each school 16 times over the year, although club meetings were occasionally not possible due to other school events such as sports days. However, a minimum of 14 meetings were held with each club.

Thematic Data Collection

At present, the Matobo Biodiversity Monitoring Programme holds approximately five years of biodiversity data which the biodiversity monitors in the Matobo Hills have collected. Training in the survey methods and the collection of this data is conducted thematically, with each school term being assigned a particular taxon. We focus on Botany in the 1st school term, Ornithology in the 2nd school term and Entomology and Arachnology in the 3rd school term. This system standardises the data enabling multi-year comparisons to be made. Biodiversity monitoring was continued into 2016. In addition to collecting data, the biodiversity monitors are provided training in the summarization and display of the collected information, which is an essential skill of biodiversity monitoring.

Term 1 – Botany

Interactive talks which covered the distinguishing features of plants, their importance, anatomy and classification were held with the biodiversity monitors. These talks were aided by visual slides as well as exhibits of the equipment that is used to collect botanical data. As the 1st school term was shortened by the early 2016 Easter holidays, data collection on vegetation (through the Point Centered Quarter Method which is used to determine the density and dominance of woody plants) was carried out in the second term.

In order to obtain a species inventory of the tree species that are found in the communal areas that surround the participating schools, the biodiversity monitors collect and press specimens of leaves, flowers, fruits, bark, pods and seeds of various plants. These specimens are mounted onto card, and form the basis of a herbarium collection, currently housed at Dambari Field Station pending identification of some specimens. Ultimately, these specimens will be provided to the schools as a reference for the future.



Photo 1: Biodiversity monitors at Whitewater High School mount and label plant specimens for the herbarium.



Photo 2: Relief Field Education Officer Bright Sagonda demonstrates how plants are pressed to pupils at Tohwe Secondary School while NHMZ Assistant Curator of Ornithology Kudzanai Dhlwayo, who had come to assist on birding, looks on.

Term 2 – Ornithology

The 2nd school term, in which the main focus is ornithology, kicked off with a presentation that provided knowledge to the biodiversity monitors on the ecology of birds. Following this, the biodiversity monitors were taken on bird watching walks in the less disturbed and more vegetated areas adjacent to their schools where they were provided practical training on the use of binoculars and on how to identify common birds found in their area. We also conducted a bird

walk at each school in the 3rd school term (November), with the aim of observing migrant birds which are not present in the winter months of the 2nd term (May to July).



Photo 3: NHMZ Curatorial Assistant of Ornithology Lovemore Temba shows the biodiversity monitors a raptor perched on a large granite boulder.



Photo 4: Relief Field Education Officer Bright Sagonda provides instructions to biodiversity monitors during a practical on the use of binoculars.

The biodiversity monitors have also, since 2013, been recording sightings of seven species of birds of interest in the Matobo Hills. The selection of these birds was based on the status of being threatened, invasive or culturally significant status. In 2016, the biodiversity monitors continued recording these sightings.

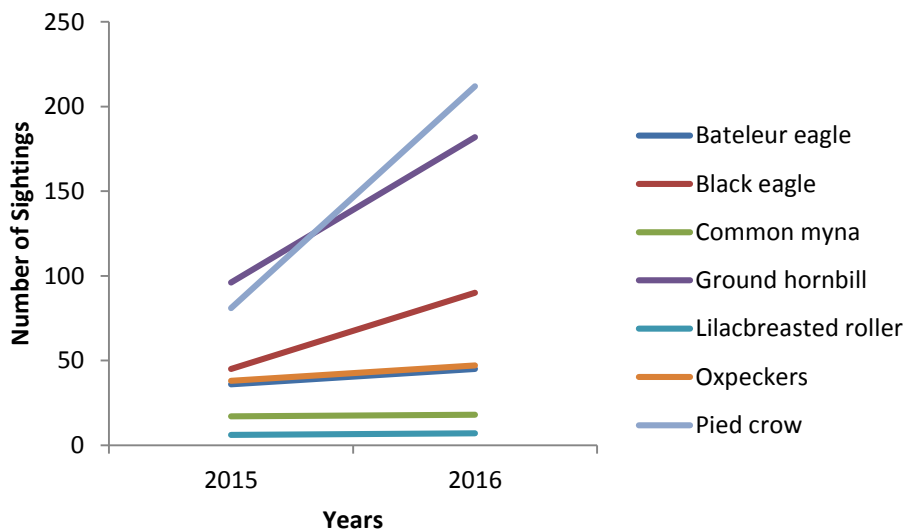


Figure 2: Recorded sightings of selected birds in 2015 and 2016.

Initial errors in data reporting (duplication of sightings) in 2013-14 resulted in inflated sighting numbers. We have since instituted a more formal approach to data collation, and are more confident of the data produced since 2015. Methods to account for differences in sampling effort between years are being devised, which will make inter-year comparisons more reliable.

Term 3 – Entomology

Insects have numerous ecological functions that are essential to mankind. As such, it is of paramount importance to monitor their populations and compositions to be able to identify and mitigate against their decline. In line with this need, biodiversity monitors have been monitoring insects since 2012 through pitfall traps which have been set at each of the schools. Technical expertise in the establishment and running of these traps and identification of collected

specimens is provided by staff of the Natural History Museum of Zimbabwe's (NHMZ) Entomology Department. Biodiversity monitors are responsible for managing the traps between club meetings. Collected specimens are accessioned at NHMZ.

NHMZ staff delivered a talk to biodiversity monitors as an introduction to Entomology. Thereafter, the biodiversity monitors were taught how to set pitfall traps. They were then instructed on how to manage these traps, which entails emptying insects from the trap jars into collecting jars, replenishing fluid levels and maintaining the positioning of the traps, and were assigned this responsibility. The traps are run through school months of the Zimbabwean wet season (September to November and January to March).

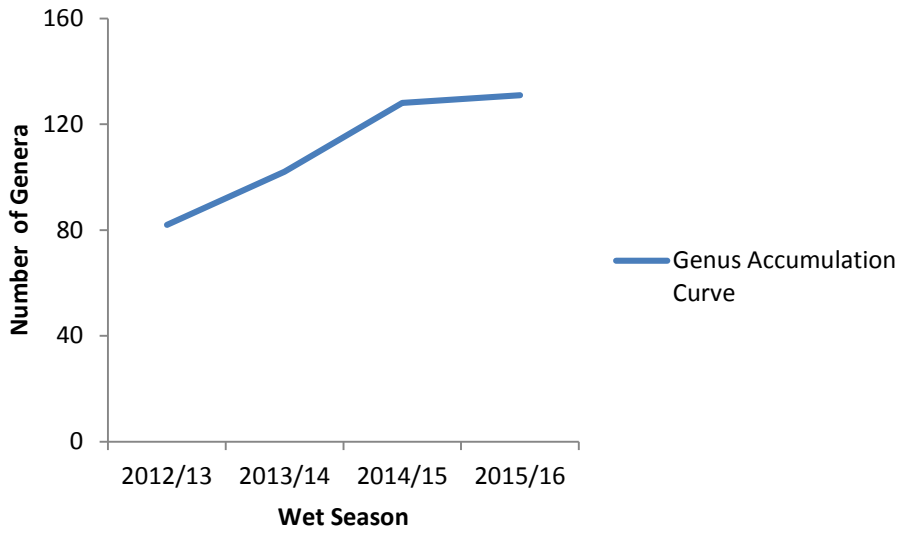


Figure 3: Cumulative number of invertebrate genera collected from pitfall traps throughout the wet seasons since the 2012/13 wet season.

A generally steady increase in the number of invertebrate genera retrieved from pitfall traps is evident from the 2012/13 to the 2014/15 wet seasons (Fig 3.) The curve began to lower towards asymptote from the 2014/15 to the 2015/16 wet season. This shows that the genus inventory of invertebrates that are found in the schools is nearing completion. Species accumulation curves are not possible at this time, as not all specimens have been identified to species level.



Photo 5: Matopo High School Biodiversity Monitor Naledi Nare explains to her peers how sweeping nets are used. George Malunga, Technical Assistant in the Department of Entomology at NHMZ, looks on.



Photo 6: NHMZ Technical Assistant in the Department of Entomology Wallace Majaya shows biodiversity monitors some professionally pinned insects.



In order to widen the biodiversity monitors' knowledge of insect sampling beyond pitfall trapping, NHMZ staff demonstrated, by use of the actual traps, the various equipment and methods that can be used to trap insects of varying size and living habits. These insect traps included the bait/butterfly trap, malaise trap, butterfly net, sweeping net and the beating tray. Demonstrations on how insects are pinned when setting up insect collections were also done.

Photo 7: Biodiversity Monitor Keith Mkhwebu from Bazha Secondary School studies a preserved baboon spider which is part NHMZ's arachnid collection.

Ad-Hoc Recordings

As the biodiversity monitors of the Matobo Biodiversity Monitoring Programme live among wildlife and some commute through wildlife protected areas, they frequently encounter birds, invertebrates, reptiles, amphibians and mammals. The collection of such data is important for the generation of a checklist of biodiversity found in the Matobo Hills, developing the pupils' interest and awareness of their environment and developing their biodiversity identification and data collection skills. As such, we provided the biodiversity monitors with basic data sheets throughout 2016 which they filled in with the details of their sightings.

There was a 54% increase in the number of contributors from 2015 to 2016 (Fig. 5) which was an improvement from the increase in the number of contributors from 2014 to 2015 (25%). Increases in the number of contributors began in 2014 and these coincided with the provision of species identification materials to the biodiversity monitors. These increases in the number of contributors also correspond with increases in the slope of the accumulation curve that represents the recorded sightings of organisms belonging to different taxonomic groups (Fig. 4). Mammals had the highest number of sightings, which were followed by invertebrates. (Fig. 4).

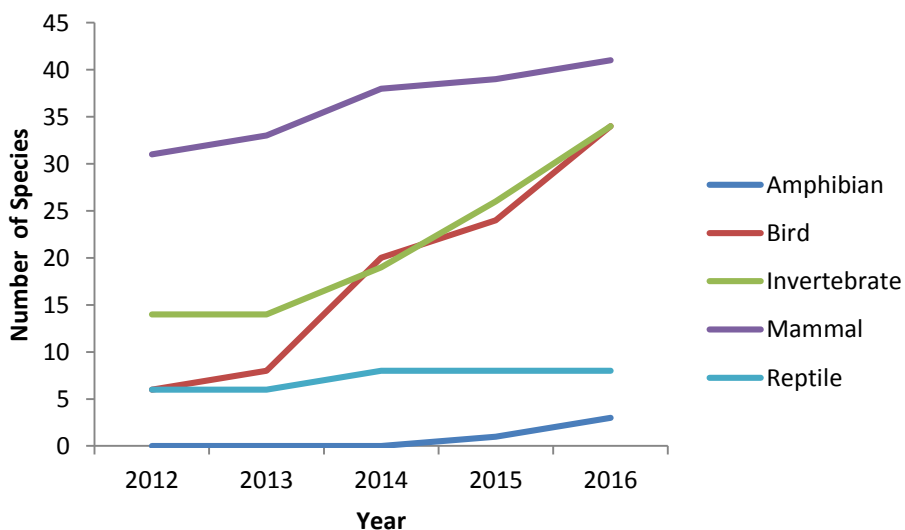


Figure 4: Cumulative number of species of major groups recorded on datasheets since 2012.

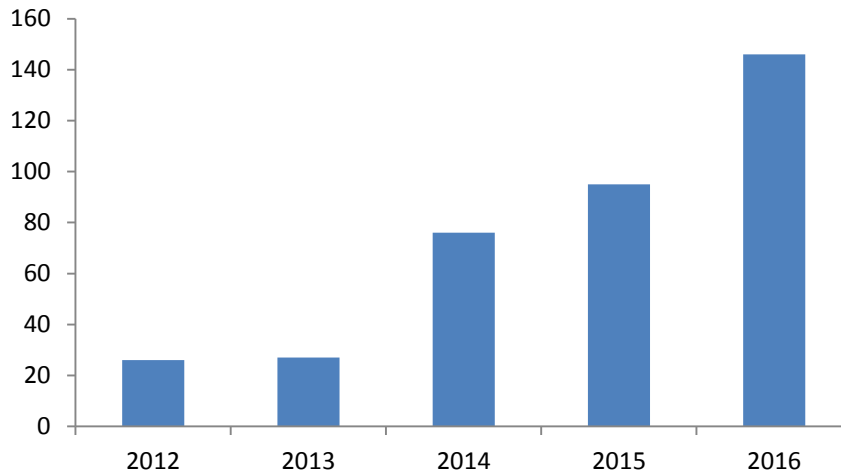


Figure 5: Number of club members that contributed ad hoc sightings of wildlife each year since 2012.

Learning Aids and Awareness Materials

Attractive materials with informative text that is accompanied by visual aids in the form of relevant pictures are an effective method of conveying important information and messages to communities. We produced such materials in-house in order to raise the environmental awareness of biodiversity monitors, their teachers and communities. Other organisations generously donated some of this material.

Awareness Posters

Environmentally themed posters were produced and distributed to each school for public display. The first poster was produced in commemoration of World Water Day (22 March) and the second was produced in response to the realisation of the fear and consequent negative attitude by people towards arachnids (e.g. spiders and scorpions). This poster highlighted the numerous services that arachnids provide in various sectors which include ecology, agriculture, disease control and medicine, nutrition, household, manufacturing and industry.

Species Identification Cards and Biodiversity Monitoring Methods Handbook

In order to make learning for the biodiversity monitors easier, we put together attractive species identification cards that could be used as flashcards, with which the biodiversity monitors could even play games and test one another. These cards were produced on a termly basis and described, where applicable, the key identification features (with pictures), size, habitat, feeding ecology and breeding habits of selected species of the group that was the focus of each term. Species specific ecological information on 24 plants, 24 birds, 12 insects and 12 arachnids were produced and distributed in 2016. We also provided the biodiversity monitors with a manual that had been updated from previous years, which detailed ecological monitoring methods and equipment.

Donated Learning Materials

The programme received from various generous organisations and individuals materials that are very useful in building the biodiversity knowledge and environmental habits of the biodiversity monitors and the communities from which they hail. These materials include BirdLife Zimbabwe's fire awareness posters, Wildlife and Environment Zimbabwe's Bushbeat Magazines, Zambezi newspapers, posters on how to develop bird friendly areas as well as other environmental magazines. Stream Ecologist and Children's Environmental Book Author Judy L. Li of Oregon

State University in USA also kindly donated copies of her two story books, Ricky's Atlas and Ellie's Log, which through their chronicles encourage the biodiversity monitors to develop an awareness of their environment and make recordings from it. Novels and Readers' Digest magazines were also donated to the schools' libraries in order to improve their literacy and performance in the English Language subject.



Photo 8: Poster commemorating World Water Day.



Photo 9: The importance of arachnids was highlighted on this poster.

Newsletters and Artistic Contributions

At the end of each school term, we produced newsletters that reported on our conservation club activities and featured natural resource inspired artistic and literary contributions from the biodiversity monitors. These contributions are a vehicle through which these communities can encourage one another in environmental stewardship, and also encourage the international community, along with showcasing their creative abilities. Newsletters were circulated to the schools, local authorities, sponsors, project partners and other parties that are interested in our work. The following are excerpts from the newsletters:

Let's Heal the World

The deterioration of our environment is an issue of concern. Veld fires, poaching and deforestation are threatening the existence of our wonderful flora and fauna. Let us maintain the state and title of the Matobo Hills as a UNESCO World Heritage Site. It's all in our hands. Michael Jackson said "Heal the World", President Obama said "Yes we can". Let's conserve our environment and heal the world.

By Lizzie Zikali, Silozwe High School

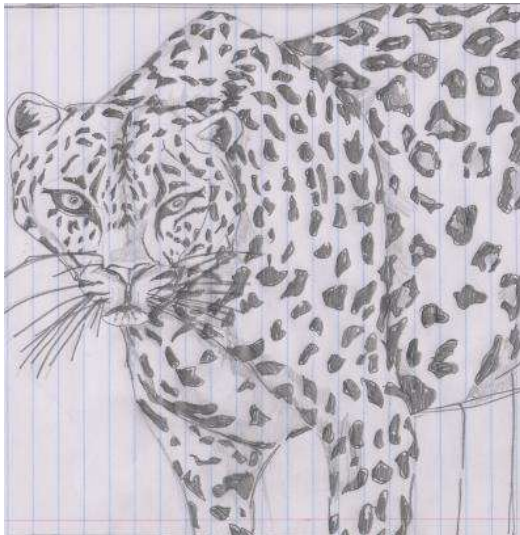


Photo 10: Leopard by Simbarashe Marikite, Tohwe Secondary School



Photo 11: African Pygmy Kingfisher by Gabriella Makandidze, Matopo High School

Africa, My Motherland

I hear the sound of the drums
The melodious music to my ears
Like honey to my tongue
Like still and fresh water to my thirsty soul
I can feel my homeland from within
My motherland

The green nature that fills the ground
The rich soil
Go s that produce medicine and good fruits
The ground which is covered by precious stones
I can feel it in me that I am home
A home that no one can replace
My motherland

Filled with wonders that have attracted every
corner of the horizon
Animals that are beyond compare
I am thrilled by the sight of the lioness which has
caught its prey
The elephants which flap their ears on a hot day
The birds wander around and view this beautiful
land.
Africa the mother of wildlife

It brings life and hope
It shades the world with wonderful colours
It gives the formless, form
It restores a lost soul
Its beauty is beyond explanation
I've been blessed to be born there
My motherland
My Africa

By Shammah L Ndlovu, Matopo High School

Thank You Dambari Wildlife Trust

Words cannot describe how great the club has done for me and also for every club member. Thank you may not be the best way to appreciate what Dambari has done for me. After all the time has come for us to leave the club but we cannot leave conservation and being biodiversity monitors in our communities. To the other club members, it is my hope that we may continue upgrading the spirit of monitoring our environment. Thank you to all Dambari stakeholders, Field Officer Cedric and others. You are doing great.

Go Dambari Go Wildlife

By Lizzie Zikali, Silozwe High School (2015/16 Cohort)

Biodiversity Games and DVDs

Biodiversity monitors worked hard during the school terms of the year 2016. Both the assimilation of the concepts we teach them and the collection of the biodiversity data are not easy tasks. At the end of each term, we thus provided “de-stressing” activities in which the pupils would have fun, whilst still learning. One such activity was the playing of biodiversity-themed card games. These were played using a set of cards, each of which highlighted a species of African bird. We also conducted a quiz competition which covered questions taken from activities carried out in botany (term 1), ornithology (term 2) and academic science subjects. The schools did well, with the biodiversity monitors at Bazha Secondary school performing best. A movie, which shed light on how birds survive and interact with other animals in different ecosystems, was also screened for the biodiversity monitors.



Photo 12: Biodiversity monitors enjoy a playing card game of “Crazy 8” using bird-themed playing cards.

Trips and Networking Events in Matobo National Park

Although the various communities from which the biodiversity monitors hail are all situated within 10 kilometres of the boundary of the Matobo National Park, very few of them have ever been inside the Park for educational and recreational purposes. In response to this need, we sought funding in 2015 for such a trip, which would be coupled with a networking event among the biodiversity monitors from the different communities who have never met in connection with natural resources. Thanks to numerous generous donations from various organisations and individuals, along with kind permissions for free entry from the Parks and Wildlife Management Authority and the Natural History Museum of Zimbabwe, we managed to hold two excursions to the Park.

The first was on the 22nd of March for the 2015/16 cohort of biodiversity monitors and on the 2nd of December for the 2016/17 cohort. On the mornings of each of these days, 80 pupils and 10 teachers converged at Maleme Dam in the National Park where they enjoyed the surroundings there and were later given a talk by a Parks and Wildlife Management Authority staff member about the fauna, flora and activities of the Park. Thereafter, they visited National Monuments Pomongwe Cave and World's View (where the graves of Rhodes and some of his men are

located) where National Museums and Monuments guides took them through the features and attractions at these sites.

The activities of the afternoons of these days were punctuated with staged performances (plays, poems and songs) from each school for their peers conveying to them messages of what they had learnt from the activities of the conservation clubs at their respective schools. At the request of the biodiversity monitors after the first event, we put in place a team of adjudicators from Dambari Wildlife Trust during the second event to judge and rank the performances. Whitewater and Matopo High Schools tied in 1st place and received Dambari branded pens with environmental messages. The pupils expressed much gratitude as, sadly, the majority of them had never visited the tourist attractions in their Matobo Hills before. We sincerely thank all parties that extended various forms of assistance which made these events a success. We look forward to making this valuable experience into an annual event.



Photo 13: National Museums and Monuments Guide Edward Mbambo speaks to the biodiversity monitors of the 2016/17 cohort in Pomongwe Cave about the natural phenomenon and the paintings in the cave.



Photo 14: Biodiversity monitors of the 2015/16 cohort at Whitewater High School perform an anti-poaching play at World's View for their peers from neighbouring schools.

Club Promotion and Member Recognition

Every year, the participating schools in our programme hold Speech and Prize Giving Days where reports are presented on the progress and activities of the school in the past academic year and pupils who have excelled in various disciplines are recognised. We make ourselves part of these events in two ways. Firstly, we donate much-needed refreshments to assist in catering for the invited guests, parents, school staff and pupils. Secondly, we provide prizes for two or three of the most committed members of our conservation clubs in the outgoing cohort. In 2016, we selected and were called upon, at each prize-giving event, to present these prizes to the following: Blessing Moyo and Petious Furai at Bazha Secondary School, Lizzie Zikali, Faith Ngwenya and Tinashe Mututwa at Silozwe High School, Mike Phiri and Mosleen Chiga at Tohwe Secondary School, Proud Sibanda and Sufficient Moyo at Whitewater High School and Gabriella Makandidze and Langelihle Sibanda at Matopo High School. The schools also afforded the Field Education Officer the opportunity to speak to the community there-present about the conservation club. Other members who actively participated in the programme (105 across all 5 schools) also received Certificates of Participation. After each event, we set up a stall which displayed community awareness posters and we spoke to parents and pupils who came to enquire about the clubs.



Photo 15: Field Education Officer Cedric Maforimbo (far right) delivers a short speech on the conservation club at the Speech and Prize Giving Day at Whitewater High School.



Photo 16: Proud parents and relatives pose for a picture with Langelihle Sibanda and Gabriella Makandidze, winners of the prizes for the Most Committed Conservation Club Members at Matopo High School.

The Fort Rixon Environmental Education Centre (FREE) invited Dambari Wildlife Trust to exhibit at their Wildlife Expo in Fort Rixon on 28 September 2016. We accepted this invitation and erected a stall where we displayed community environmental awareness posters, species identification cards, MBMP newsletters and gave out rhino awareness flyers as well as BirdLife Zimbabwe fire awareness posters. For the children, the bird educational board game “Cranes in Crisis” was provided. Several community leaders and members of the Fort Rixon area, many of whom were school pupils, attended the event and gained wildlife education as well as an insight into the activities of our Matobo Biodiversity Monitoring Programme along with those of four other wildlife entities in the Bulawayo and Matabeleland areas.



Photo 17: Pupils from the Fort Rixon area look at MBMP awareness materials.



Photo 18: Pupils from the Fort Rixon area play "Cranes in Crisis", a biodiversity board game as Dambari Attachment Student Jacqueline Chigunwe looks on.

BirdLife Zimbabwe Art Competition

The biodiversity monitors took part in an art competition held by BirdLife Zimbabwe on the 27th of May. Considering the short notice given to them to produce this work, they did a splendid job. Unfortunately there was no winner from Matobo Hills’ schools. However, all pieces of art were publicly displayed during the prize giving ceremony after which they were transported to the Italian Embassy where they continued to be displayed for the Italian National Day held on the 2nd of June.

Project Evaluation

Tracking the effectiveness of any programme is essential, as this enables positive adjustments to be made to the programme and helps to quantify successes. One method that we use is measuring changes in pupils' knowledge and attitude between recruitment and leaving the club. Pre- and post-training questionnaires are administered, and results are compared for the same cohort.

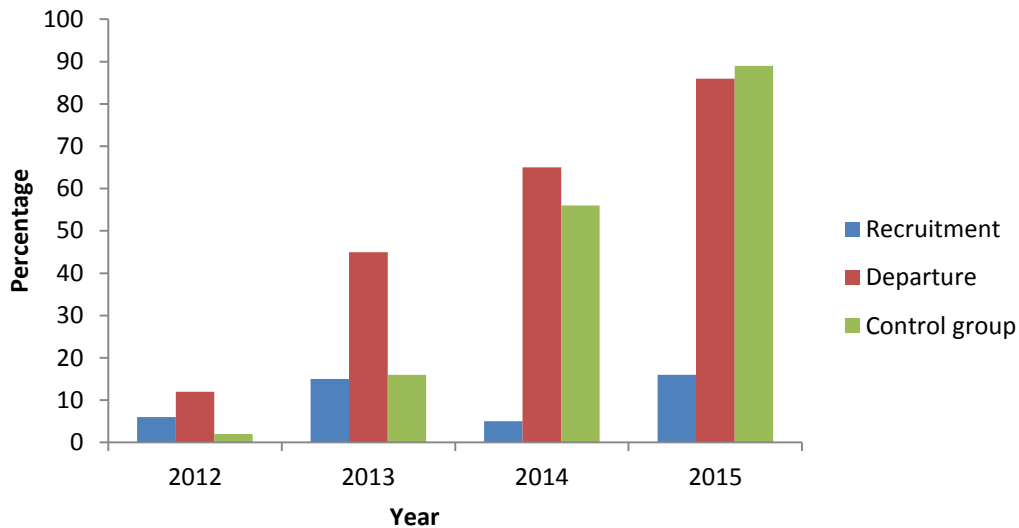


Figure 6: Changes in club members' knowledge of the definition of the word "conservation" from the time of recruitment to leaving the club. The knowledge of their peers was also measured in order to determine if there was any percolation of information.

There has been a steady increase from the 2012 to the 2015 cohorts in the number of pupils who could correctly, meaningfully and unambiguously define the word "conservation" at departure from the conservation clubs, which was 12% in 2012 and 85% in 2015. In the 2015 cohort, there was an improvement from 16% to 85% between recruitment and departure from the club respectively in the pupils that could correctly define conservation (Fig 6). As one of the objectives of the programme is to produce conservation message multipliers, we also measured the knowledge of the peers of conservation club members, who were not members of the club. A dramatic increase in their knowledge was noted throughout the years (Fig 6) from 2% in 2012 to 89% in 2015. These measurements were taken without actively reinforcing the definition of the word throughout the programme.

When asked by means of a questionnaire who they felt was responsible for protecting natural resources, there was a 48% increase (Fig. 7) in the proportion of children who believed that it was the local community as opposed to authorities or non-governmental organisations from recruitment in 2015 to departure from the club in 2016. When we administered the questionnaire to the peers of the 2015 club members (control group) in 2016, 59% of them indicated that they believed that the local community was responsible for protecting natural resources, which was a drop as compared to the 2014 cohort's peers in which 72% of them believed that the local community was responsible for protecting natural resources.

To measure if (and how) knowledge and information are passing from club members to their peers and communities, we hope to conduct a survey in 2017.

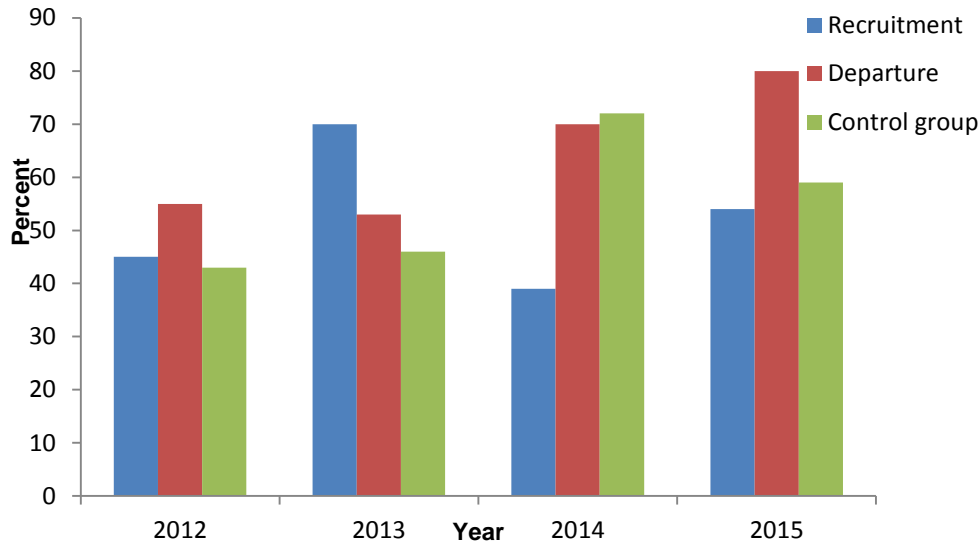


Figure 7: Percentage of children at recruitment and on leaving the club who believed the local community should be responsible for conservation as opposed to any authority.

Visit from Gwanda State University Students

In the first school term, we were joined at two of our conservation club meetings by undergraduate students from Gwanda State University who are studying towards a Bachelor's degree in Animal Science. During the conservation club meeting at Whitewater High School, they joined the biodiversity monitors as they received practical training on the setting up and maintenance of pitfall traps. This was part of their Entomology module and served as the practical follow-up to theoretical training that they had received at the Natural History Museum of Zimbabwe on pitfall traps. At Bazha Secondary School, they learnt about and practised, alongside the biodiversity monitors, how to carry out the Point Centered Quarter Method (PCQM) for measuring woody plant density and dominance. As part of their Extension module, the students also observed how we communicated biological information to the rural communities. As a token of appreciation to the schools for hosting them, the university donated branded pens and rulers.



Photo 19: A Gwanda State University student works together with a biodiversity monitor in measuring the distance of a tree from a point during a PCQM practical at Bazha Secondary School.



Photo 20: Biodiversity monitors at Whitewater High School network with Gwanda State University students.

Conservation Club Alumni

We received a career update from Prince Dube, who was one of the most committed conservation club members of the 2014/15 cohort at Bazha Secondary School. After his time at the school and in our conservation club, Prince went on to be accepted for training as a Game Ranger with the Parks and Wildlife Management Authority, which training he successfully completed in December 2016. "I thank you very much for the concepts you taught us, my training became easier. It was my dream to work for Parks," he said. Such stories are very heart-warming and motivate us to continue working hard in our quest to bring raise a vibrant generation of environmental stewards.



Continuing Professional Development

Participation of staff in related environmental programmes contributes to the success of the MBMP as these staff gain a diverse set of skills and ideas for application to the programme and also get to grow the programme's network globally. In this vein, Field Education Officer Cedric Maforimbo participated in the 2016 International Visiting Wildlife Biologist Programme with the United States Forest Service stationed on the Willamette National Forest in Oregon, USA. During this time, he organised and delivered conservation education talks to several schools and summer camps. He also co-ordinated a project entitled "Hummingbirds Forever!" in which he led a team of public volunteers in conducting surveys on pollinators (hummingbirds and bumblebees), wild flowers and in carrying out bioblitzes. He also assisted the resident Wildlife Biologist and worked with other staff there in doing surveys on harlequin ducks, bald eagles, peregrine falcons and Sierra Nevada red foxes.