



Annual Report and Accounts (Financial Statements)

For the Year ended 28 February 2021



THE GOBABEB TRUST

Trust Registration Number T53/98 (Namibia)

Message from the Chair of the Board of Trustees

It is with much pleasure that I report on behalf of the Board of Trustees, as to progress at the institute during the 2020/2021 financial year, one of the most challenging periods in the history of Gobabeb.

The achievements of the institute are singularly remarkable under the prevailing circumstances, given that activities were impacted by a double hit of the persistent economic contraction, further compounded by the devastating consequences of the corona virus. The impact of the COVID-19 pandemic continues to be felt in every walk of life and Gobabeb's experience has been no different. At the start of 2020, the year ahead was full of promise for new partnerships and exciting opportunities for growth. However, the start of this financial year coincided with the pandemic emergence and COVID-related restrictions on movement and withdrawal of planned activities on campus by local and international science visitors.

While the world reeled in the relentless barrage of cumulative pandemic impacts, Gobabeb has been able to pursue its mandate and conduct operations - to a large extent. Protected by its remote location in the Namib Desert, it is somewhat preconditioned to quarantine and self-isolation. Internal activities could continue, and the facilities have remained open and active, within the constraints of heightened safety measures in compliance with national directives. In her report, the Executive Director will highlight some achievements of the institute during this extraordinary time. Technical summaries will further elaborate on the outputs of research and learning operations. The team can again be commended for both the outputs as well as their unflinching and united commitment to perform despite COVID-related difficulties.

Probably the most debilitating factor, has been the drastically reduced income to Gobabeb through wholesale cancellation of visits and excursions, representing a loss of

income of some 36%. When the severity of movement restrictions to contain the spread of the virus became known, management immediately revisited their budget, developing various scenarios that would play out to balance expenditure to actual income. A rigorous bi-monthly (mid-month and month-end) financial tracking procedure was developed and employed in support of fiscal prudence. Austerity measures were immediately implemented to cancel planned upgrades and delay non-essential expenses, while retaining core operations and skills as long as financially viable. Due to these measures Gobabeb has been able to sustain its operations without reducing salaries or retrenchments. However, the threat to sustainability is a very real one – and maintaining Gobabeb as a going concern will be a real challenge in the future. It is in this respect that the Trustees have a role to play in supporting management through the coming years until the world has recovered from the global economic fallout from this unprecedented pandemic.

A highlight in this year of doom and gloom was that a new twenty-year renewable cooperation agreement between the Trust and the Ministry of Environment, Forestry and Tourism (MEFT) has been signed by the Honourable Minister. This agreement operationalises the Trust and clearly stipulates the roles and responsibilities of both Parties, particularly pertaining to the facilities at the Gobabeb campus in the Namib-Naukluft National Park (NNNP). It heralds in a new era of partnership in which mutual benefits may be realised. For example, the new management plan being developed for this protected area will also be able to draw on Gobabeb to generate and avail science-based evidence in support of MEFT's conservation efforts.

Board activities have been curtailed by lockdowns and travel restrictions, as well as the legal requirements required by any changes in the governance body. A minimum

of six certified Trustees must be in place to represent a legal Board of Trustees. Unfortunately, we again had Trustee resignations, and new nominations had to be tendered for certification. Despite the convenience of digital meetings, which has offered a networking solution during COVID times, our preference would be for this new governance structure to have its inaugural meeting on site. I am looking forward to this opportunity for Trustees to engage with Gobabeb staff and to get a real appreciation of the challenges faced by the team on a daily basis – as well as learning about the successes, on so many levels, which have resulted out of adversity and true grit.

The impact of COVID-19 on the finances and operations of the Gobabeb Trust will not be confined to just this one year and will be seen in our annual reports and accounts for some time. However, we are confident that the resilience of this institution, bolstered by support from the Board of Trustees and a multitude of development partners and science collaborators, will not only allow Gobabeb to prevail but will see it achieve and surpass the levels of performance that we have come to expect.

Teofilus Nghitila
Chairman

Report of the Executive Director

One of the oldest desert research facilities in the world, Gobabeb continues aspiring to be a catalyst for gathering, understanding and sharing knowledge of arid environments. Our vision is to contribute to a realisation of the universal value of the Namib Desert, in its broadest sense. Operating within an economy that was in recession even before COVID-19, as well as the wide-ranging impacts of the pandemic, Gobabeb's performance has remained remarkably steady. It is within this context that we would like to share achievements during the 2020/2021 financial year. Detailed information on activities and achievements is provided on pages 7–17.

The corona virus has wreaked havoc on all aspects of society across the globe, with the transport, hospitality, tourism and cultural sectors particularly hard hit. A significant portion of Gobabeb's predicted income was abruptly removed when travel restrictions prevented all visits by research partners, university and school groups and even the general public. New science collaborations that would have been initiated by field campaigns at Gobabeb were not able to be realised. This

was a double whammy, setting back research effort as well as representing a loss in income. In addition, anticipated financial support through various mechanisms like the NCRST Research Capacity Building Grant still did not materialise. Management continued to conceptualise new project ideas and submit applications in response to grant calls. Some 16 applications were submitted. COVID's tentacles even reached these processes causing delays in reviews and subsequent outcome announcements, or even being an integral prerequisite element in project concepts. No feedback was received from Gobabeb's application to the Social Security Commission's Stimulus 2020 facility to support organisations impacted by COVID.

Doubling down on austerity measures, reworking our operational workplan and budget and developing various scenarios to overcome projected declines in income, allowed us to maintain our routine activities during the past year. New procedures were implemented to keep our finger on the pulse of our financial situation, which allowed us to be nimble in decision-making on expenditure;

while some unexpected income through a new project in collaboration with the UNDP and accommodation required by various projects in the Namib-Naukluft National Park (NNNP) offered welcome relief. No staff were made redundant, and no salary cuts that were anticipated had to be instituted.

During these toughest of times, it was again our committed and tenacious staff who rose to the occasion. Most staff elected to stay on site during the lockdowns, and work continued unabated. Spirits remained high and the strong sense of camaraderie ensured that no one suffered from the unusual insularity during this extraordinary time. We were fortunately spared from infection, as forays into town to purchase provisions strictly complied with regulations regarding social-distancing and PPE. From my own perspective, it was a privilege to have experienced the reality of the pandemic in the company of our current cohort of staff – they were absolutely and unequivocally brilliant!

Like all clouds, the COVID cumulus had a silver lining.... due to the dearth in visitors, we able to focus inward. Time and undivided attention could be directed towards supporting our student associates conducting research for postgraduate qualifications. In this regard, we would like to recognise the Namibian Chamber of Environment for supporting the study fees of four staff, while Swakop Uranium continues to support the studies of four NERMU staff. A total of 10 staff is currently registered candidates for qualifying training (2 PhD; 8 MSc).

On the legal front, huge progress was made: our amended and restated Deed of Trust was registered with the Master of the High Court, and the research collaboration agreement with MEFT, that operationalises the Trust was signed by the Honourable Minister. Registering our Trustees, in order for us to constitute a legal Board, is the next hurdle. Our Trustees have an essential role to provide vision, advice and leadership to management, particularly regarding a sustainability strategy for Gobabeb. We appreciate also that a

transition to the new full moniker will take some time – but the name ‘Gobabeb’ is fortunately entrenched, while the clarifier ‘Namib Research Institute’ emphasises our location and core function.

Some incipient interactions with potential new research partners matured despite COVID restrictions. In particular, collaboration was advanced with the Universities of Bonn and Cologne in Germany, through approval for the CRC-1211, a multidisciplinary programme, spanning geosciences, biology and physics, funded by the German Science Foundation (DFG) and focused on mutual evolutionary relationships between Earth-surface processes and biota. It aims to compare the evolutionary trajectories of the Namib and Atacama, the two oldest deserts on Earth by isolating key fingerprints of biological activity at the (water) limit of the habitable earth and to characterise the earth surface processes operating in the (virtual) absence of liquid water. We were able to identify a Namibian PhD candidate for this programme, who has commenced studies in Germany on a subproject under the biology component.

Gobabeb supported two successful Fulbright applications. The scholars were scheduled to be hosted full-time by Gobabeb during 2021. Unfortunately, COVID again put the kibosh on these plans, and the fellowships have been deferred to 2022 upon recommendation of the US Embassy. We did provide field support to a NUST-hosted Fulbright Scholar, sampling nematodes in the central Namib, which will result in new information about these little-studied organisms in the Namib.

Despite our operational constraints and budgetary woes, Gobabeb's research output remains consistent. Research carried out over past years at Gobabeb, and data collected through the array of instruments hosted by Gobabeb and maintained by our staff, resulted in 37 peer reviewed papers and 7 theses being completed in the 2020 calendar year (page 29–32).

As an integral component of the research process, training remains a core function. Unfortunately, our training activities were also severely curtailed during the period under review. No school groups visited the institute, and three planned university excursions were cancelled. Our annual Youth Environmental Summit (YES), scheduled for May 2020 and focusing on Grade 11 learners from the Hardap Region, was cancelled. Our partners in this particular intervention, MEFT/giz- BMCC II project agreed to a modification in the approach – and RMI (Research Methodology Internship) was born. Modelled on the very successful SDP, RMI recruited 13 Namibian university graduates to conduct a countrywide survey on perception and attitudes of the Namibian public regarding the plastic bag levy, introduced in 2019. The research was designed in collaboration with the University of Plymouth in the UK (page 13).



RMI participants at public presentation in Windhoek

With limited funding available through the London Zoological Society, we are currently only able to support one WIL student from NUST annually.

Another new training initiative was developed in close collaboration with UNDP. Funding has been secured for at least three but potentially five iterations of “Climate Action for Millennials Programme (CAMP)”. This programme mobilises national and international expertise to prepare and sensitise young professionals on climate change science and to communicate this information to learners throughout Namibia. The first of these events was hosted by Gobabeb in January 2021 – and already proved

to be hugely successful in developing and sharing evidence-based information on climate change in Namibia.



CAMP participants at Gobabeb

Creating awareness through involving the public in our research effort is another learning strategy. With lockdown restrictions, these activities were limited. A few individuals looked to escape to Gobabeb and learn more about our work, when travel restrictions were lifted. These visits were much appreciated, and reminded us of more normal times when Gobabeb was a popular destination for both local and foreign visitors wanting to experience the magnificence and universal value of the Namib.

Gobabeb’s social impact is largely measured through our services to the local Topnaar community. Movement in the community was limited during the pandemic, however. We continued to manage bursaries for three Topnaar learners at Coastal High School.

MEFT is a key strategic partner for Gobabeb and the finalisation of the research collaboration agreement between the two organisations was a highlight in 2020. Gobabeb continues to provide scientific services to support the management of the NNNP and offer our facilities to those park-based officials operating in the Gobabeb surrounds. We anticipate that the NamParks V project will further cement our partnership, and the promised infrastructure development, as part of this initiative, is eagerly awaited.

The extreme desert conditions are unrelenting and take their toll on the aging campus infrastructure. Fortunately, Gobabeb again benefited from support of the giz, via their Biodiversity Management and Climate Change (BMCC II) project in this regard. The ICT tower/hub was modified to be climate-controlled, while the ancient server and back-up hardware was replaced with a modern NAS. The electrical system was checked, faulty connections repaired, and light fittings adapted for the installation of LED bulbs, which resulted in a significant decrease in energy consumption. The bespoke waterproof lining for the water-tower was designed and manufactured in South Africa. Once installed, this lining will prevent leakage and continuous weakening of Gobabeb's iconic structure.



Interns at work, prepping the pool for repairs

Providing recreational facilities for staff is important at the best of times, but COVID

underscored the importance of offering options that contribute to well-being and good health. The swimming pool, out of commission for several years due to cracks, was refurbished with support from MEFT – much to the delight of our staff. They had spent many a weekend scraping down and grinding away surfaces, preparing the pool for its makeover!



Interns at play, enjoying the pool

As we embark on the future, the sustainability of Gobabeb remains a top priority. With our sights on celebrating 60 years of existence and research excellence in 2022, the challenge will be on all those touched by Gobabeb over six decades to rally to its call for support, ensuring that the Gobabeb legacy will live on.

Dr Gillian Maggs-Kölling
Executive Director

Report of the Board of Trustees

The Gobabeb Board of Trustees has pleasure in presenting their annual report and accounts for the year ended 28 February 2021.

Organisation and Governance arrangements

Gobabeb is a registered Trust (T53/98). An amended and restated Deed of Trust was approved by the Master of the High Court on 07 January 2020. The Trust operates under the name *Gobabeb – Namib Research Institute*, which reflects its geographical location, mandate and scientific reputation.

Ellis Shilengudwa Incorporated are the appointed Trust Administrators for the Gobabeb Trust, a service they provide *pro bono*.

A new cooperation agreement between the Gobabeb Trust and the MEFT was signed on 15 January 2021. The cooperation agreement continues to provide access to the facilities in the Namib-Naukluft National Park to the Trust under certain terms and conditions, encourages an expansion and diversification of research activities and promotes a closer partnership for the benefit of the management of this protected area.

Statement of Trustee responsibilities

The Trustees are responsible for preparing the Trustees' Report and the financial statements in accordance with applicable law and accounting standards, i.e. International Financial Reporting Standards for Small and Medium-Sized Entities (IFRS for SMEs).

The law applicable to Trusts in Namibia requires the Trustees to prepare financial statements for each financial year, which give a true and fair view of the state of affairs of the Trust and of the incoming resources and application of resources of the Trust for that period.

The Board of Trustees is furthermore responsible for setting out the strategic direction of the institute and assisting with defining its priorities. It also approves the terms of reference, appoints, and monitors the work of the Executive Director, to whom all operational matters are delegated. The Board endeavours to meet at least three times a year to carry out its decision-making and strategic responsibilities.

Gobabeb Governance

The governance structure of the Trust has been amended to broaden participation and acquire specialist skills to enhance the capacity of the Board to provide appropriate guidance to the operations of Gobabeb.

The Board of Trustees consists of no fewer than six and no more than ten Trustees. These Trustees shall include the following: Two representatives from MEFT; Two representatives from Namibian-based universities; One representative from a national agency responsible for research in Namibia; One representative from an NGO with a research track-record; One representative from a regional or international organisation of repute; One representative from private sector with business, legal and/or financial expertise.

The following Trustees are currently registered by the Master of the High Court:

Mr Teofilus Nghitila, MEFT (Chair)
Mr Timoteus Mufeti, MEFT
Dr Anna Matros-Goreses, DRFN
Mr Morné du Toit, NUST (resigned January 2021)
Prof Isaac Mapaure, UNAM
Mr Charles Loots, B2Gold/Private Sector

A nomination to replace Mr Du Toit as NUST representative was received; and the incoming Vice Chancellor, Dr Eroid Naomab will now represent NUST. The NCRST, as the national agency responsible for research in

Namibia, was identified as a potential partner, but has declined a seat on the Board of Trustees.

Due to delays in the registration process, and the turn-over of Trustees representing NUST, the new Board of Trustees was not able to legally meet during the period under review. The situation was further compounded by travel restrictions imposed by national COVID-responses. However, the Executive Director periodically updated the Board Chair on progress at Gobabeb.

Management

The Executive Director at the end of February 2021 was Gillian Maggs-Kölling. The Executive Director is responsible for the day-to-day management of the Institute's affairs and for implementing policies and strategic advice endorsed by the Board of Trustees. She is supported by a small but dynamic management team, which consisted of the Research Manager (Eugene Marais), the Office Manager (Elna Irish), and the Accountant (Ileni Hiwilepo). Technical advice is solicited when required from experts and associates in various sectors, including science, natural resource management, infrastructure development and tourism.

Activities and Achievements in 2020/2021

Strategic

A five-year Strategic Plan (2017–2021) provides the requisite implementation framework for Gobabeb. This plan informed the annual operational planning and budgeting for Financial Years 2020/2021 and 2021/22, based on eight strategic objectives in the following four key areas:

- Financial Sustainability;
- Stakeholder Relations;
- Research Excellence; and
- Human Capital.

Research

Gobabeb was essentially in its own bubble during the pandemic, which allowed it to continue research activities conducted by its staff despite even more frugal fiscal measures. Almost all collaborative and participatory research with partners elsewhere in Namibia and the world was put on hold until the

situation could be clarified. Repeated waves of infections, and severe restrictions in travel to and from the Erongo Region where the earliest coronavirus outbreaks in Namibia were recorded, resulted in Gobabeb focusing on its own research and maintaining the array of instruments for monitoring services. Gobabeb initiated and maintained all the preventative measures that were recommended to avoid infections, though it never required strict isolation from others. None of the institute's staff were infected during the period under review.

Fortunately, Gobabeb's staff remained highly motivated and continued to focus on the objectives of their own investigations and duties in support of long-term research initiatives. Where feasible, the institute's staff stepped up to carry out work that could not be accomplished by partner organisations. One would have expected that the global disruption would have resulted in greater research output as researchers could focus on analysing and reporting on past results, though an actual decline in reporting results (pages 29–32)

suggests that anxiety may have affected productivity.

Gobabeb encourages and supports its staff to improve their qualifications through research. For that reason, Gobabeb made a deliberate decision to continue financial support for its staff as long as possible, despite the uncertainties regarding the impact that COVID-19 may have on the institute. Gobabeb therefore offered to retain the research associates of all six new projects that started early in 2020, as well as the seven projects that were already underway. During the year, Gobabeb decided to support an additional project towards qualifying studies. Three staff members (Halle Shaanika, NUST; Saima Shikesho, UCT; Jess Roberts, UP) completed their research and analysis towards Master degree qualifications during this period while another ten staff and research associates are engaged in formal studies (pages 21–22). Altogether seven students associated with Gobabeb submitted dissertations during 2019 (see Bibliography, Annex I).

Gobabeb's restoration unit, NERMU, continued with its biodiversity research and completed the last of the monitoring fieldwork at Husab, funded by Swakop Uranium (SU). The monitoring projects are designed to inform the mining company's decisions for impact mitigation/prevention as prescribed by their Environment Management Plan. Due to COVID lockdowns and restrictions, activities were delayed. Data on riparian vegetation health (the impact of ground water abstraction on tree health) were gathered in late May, but the *Welwitschia* health monitoring (to determine the water supply for welwitschias and therefore the potential effect of obstructing the flow of water in washes by mining activities), was only conducted in July by other members of the Gobabeb-based team as lockdowns prevented NERMU staff from entering the Erongo region. A further monitoring campaign was conducted in October/November 2020. The impact of dust on shrub health was assessed on the Husab plains. Data were cleaned and analysed and two sets of monitoring reports were delivered to Swakop Uranium.



Data were also gathered on *Welwitschia* cone production, which we related to other indicators of health in *Welwitschia* plants. Another report was produced from these data and delivered to Swakop Uranium.

Two posters (downloadable from the Gobabeb website) were produced to be used in an environmental awareness campaign by the mine. The posters were also used by the Namibian Uranium Institute to create fact sheets for the same purpose.

The Monitoring Framework was updated and is near completion. This document is intended to be a guide to the SU environmental team to continue monitoring the mine impacts on the surrounding environment. The selected indicators, methods and reference values were derived from the monitoring campaigns that were completed in the past five years.

Research and capacity building continue as an integral part of the SU project. A PhD in Natural Resource Science study on the *Evaluation of human-induced water stress in riparian trees of the central Namib Desert* (Elbe Brunette, NUST) is progressing well. Fieldwork and most of the data-analysis are completed. One manuscript from this work is ready for submission, another is complete, but needs input from other authors, and a third is in draft.

Jonas Lipopela progressed with his Master study on the Husab sand lizard. He completed the data collection for the development of two niche models, one at the scale of the whole

Namib Desert, and one at the scale of the central Namib, where the species is known to occur. His preliminary results show a remarkable congruence of central Namib environmental characteristics with the species' presence, with all model variations predicting a limited distribution along the Khan and Swakop valleys and slightly beyond. He is working to collate information on the closely related inornate sand lizard, to determine whether they might overlap or not.



After having had her concept PhD proposal approved by NUST's Higher Degrees Committee (HDC), Paulina Fendinat prepared and submitted a full research proposal, which was subsequently returned by the HDC for major corrections to be made. She has started on these and hope to have a revised version ready for evaluation by the HDC at their next meeting in March 2021.

Hallelujah Shaanika submitted his thesis in July 2020 on *Assessing the likelihood that burrowing gerbils in the central Namib are ecological engineers* and was awarded his MNRM degree by NUST at the end of 2020.

Many of the institute's accomplishments flow from establishing and nurturing partnerships. Such partnerships become even more valuable during periods of hardship. The period under review emphasised the value of mutual support. One such partner is the Zoological Society of London that provides modest support for Gobabeb's GTRIP initiative. This allows Gobabeb to every year engage a WIL student from NUST to gain practical experience

in applied research. Gobabeb was able to return the assistance when researchers from Europe were unable to travel to Namibia for regular interaction with habituated baboon troops at Tsaobis and carry out their annual census to understand the dynamics within baboon troops. Gobabeb could assist by sending a team of staff/observers to engage with the baboons and carry out the required censuses.

The lockdowns caused dilemmas for many researchers. One such researcher was Dr Amy Treonis, who just started as a Fulbright scholar at NUST and who intended to investigate nematodes in Namibia, based on a proposal developed in collaboration with Gobabeb. Dr Treonis was on sabbatical from her university, thus for many years would not have been able to have such an opportunity again for intensive research. Even though her envisaged collaboration with students and staff at NUST could not take place due to pandemic restrictions, she was able to conduct extensive research within the Gobabeb 'bubble' to advance knowledge about this neglected group of organisms in Namibia.

As was the case all over the world, an international conference on aeolian geomorphology that was scheduled for July 2020, with Gobabeb as one of the coordinating institutes, had to be postponed indefinitely into the future. Other conferences were reformulated as virtual conferences, but unfortunately Gobabeb was not able to effectively participate due to its limited internet connectivity.

However, the flip side was that student researchers could continue without distractions. Ms Saima Shikesho, who investigated zoochorous seed dispersal of the endemic !nara melons (*Acanthosicyos horridus*) in the Namib Desert dunes by jackals and synzoochorous dispersal of the same seeds by gerbils, could focus and complete her studies (MSc, UCT). Ms Jessica Roberts spent long hours observing Namibia's only truly endemic birds, the dune larks *Calendulauda erythrochlamys*, to understand their behaviour to cope with temperature extremes and nutritional

challenges in the Namib Desert. Jess finished her studies with a distinction (MSc, UP).



The young researchers that just started their studies at Gobabeb found it a bit more challenging as opportunities to interact with other students and mentors were severely curtailed. Ms Ailly Nambwandja (MNRM candidate, NUST), who is using an unmanned aerial vehicle (UAV) fitted with a Sequoia multispectral camera to monitor lichen photosynthesis as an indicator of environmental health and recovery in very sensitive environments, had to learn operational procedures by trial and error due to restrictions on face-to-face training. Mr Ndelimona lipinge (MSc candidate, UCT) found himself in a similar situation as restrictions did not allow his supervisor to come and assist him with technology to track Namib Golden Moles (*Eremitalpa granti namibiensis*). Ndelimona responded to the challenge of investigating the habitat use of these cryptic, nocturnal animals by going out early in the morning to follow and interpret the tracks they leave in the sand.

Mr Natanael Ndilenga (MSc candidate, US [RSA]), Mr Martin Handjaba (MSc candidate, NWU) and Ms Leandri Wessels (MSc candidate, NWU) had it a bit easier. Nata is continuing with a study on *Welwitschia mirabilis* pollinators that he started as an honours project. Martin is one of the most experienced young researchers at Gobabeb and is very familiar with the gerbils of the Namib Desert and drivers of soil temperatures to investigate the thermal ecology of gerbils and their potential use of burrows as thermal refuges. Leandri is a trained

atmospheric scientist and geographer that is well qualified to investigate the thermo-topographic controls of biological soil crusts associated with gypsum soils. Mr Brendan Luyanda (MSc candidate, UNAM [Katima Mulilo]) was offered an opportunity by Gobabeb to investigate barking geckos towards developing predictive occupancy models of the various species late in the year, after the most severe restrictions were lifted, and could therefore consult in person.

Ms Ndapandula Shihepo (MNRM candidate, NUST) was able to benefit in an unexpected way from the technological approaches to continue international networking during a time of severe restrictions on movements, as well as the good relations that Gobabeb has established with other institutions. Ndapandula is investigating public perceptions on the use of single-use plastic bags and the associated environmental levy on plastic bags that was introduced in Namibia. The framework of her project was developed in consultation with experts in environmental psychology and plastic pollution at the University of Plymouth (UK), while her project idea attracted considerable interest from both UNAM and NUST. She decided that the likely NUST mentor has greater relevant experience to the project. On the other hand, the pandemic restrictions severely curtailed her ability to carry out face-to-face interviews with respondents.

The latter project is indicative of Gobabeb's desire to pursue a healthy mix of academic and applied research. Gobabeb therefore selected a project to improve understanding about the use of riparian forest resources by the indigenous residents of the Namib-Naukluft National Park (NNNP). Ms Noita Josop (BNRM, NUST) pursued the study and was able to show through interviews as well as observations that perceptions about unsustainable use of woodland resources in the Kuiseb is incorrect. These observations could directly contribute to a new management plan for the park that is under development. Similarly, Gobabeb continue to investigate Human-Wildlife Conflict (HWC) in farming communities resident in the

NNNP. It maintains a network of trail cameras and responds to community information about incidents of conflicts. Gobabeb also tried to recruit a Masters degree student to investigate the issue more intensely, but still need to identify a suitable candidate.

In addition to our established projects, Gobabeb continue to develop new research initiatives. Securing sources of income is of course important, but Gobabeb considers it as fundamental to identify future research as a vehicle for investment in human and infrastructure capacity building. Thus, a core function of the institute's leadership is to ensure ongoing review of the institute's strengths and strategic needs, as well as continuous scoping of global and national research opportunities relevant to the institute's abilities. When suitable opportunities are identified, Gobabeb consults and engages with potential partners to formulate projects with achievable objectives.

Gobabeb prepared and submitted fourteen research funding proposal submitted proposals for research or capacity building to various agencies and foundations during 2020/21. Four modest proposals to fund registration fees for some of our students were successful (through the Namibia chamber of Environment), while Gobabeb was informed that three other proposals submitted during 2019 may be activated later during 2021. Most of the research proposals were unsuccessful, many due to redirection of funds to deal with fallout from the pandemic. Outcomes for other proposals are still pending as they are still under review.

Maintaining, improving and judiciously expanding research infrastructure and data collection systems are essential investments for productive and results-oriented research. The regular monitoring and data collecting activities continue to be utilised and is a major component of Gobabeb's international research impact, of which meteorological data are particularly useful. Gobabeb therefore commissioned a new automated weather station (AWS) in the Saagberg area of the NNNP

during December 2020 by utilising a number of functional sensors that it had available as replacement parts. This expansion to the Central Namib meso-array should contribute further to understanding the meteorological dynamics and possible expressions of dynamic climate change in the region. In that context, although conditions seemed favourable for rain during the 2020-2021 La Niña season in Namibia, only 12 mm of rain was recorded. However, the lower Kuiseb aquifers were recharged by the highest floods for the last decade.

Training

All regular training programmes for learners and university students, on request, were suspended during the past year due to COVID-19. One group of 19 learners visited Gobabeb in March 2020, before lockdown. A total number of 24 university students participated in Gobabeb graduate student training offerings. This is a significant reduction in total number of annual trainees, when compared to the previous years.

Only one third-year NUST student participated in the six-month internship programme, GTRIP, during the year under review. This student was co-funded by the Zoological Society of London and Gobabeb. The intern and her project were:

- Ms Noita Josob, NUST-WIL, *An analysis of household use of forest resources in the Lower Kuiseb, Namib-Naukluft Park.*

The sixth iteration of the postgraduate Biophysical Field Methods course was not able to be conducted in February/March 2021, due to the ongoing COVID restrictions, especially affecting international travel. The funding to support previous participation of 11 Namibian postgraduate students, advanced by Gobabeb, has been requested and is awaited from the NCRST, Research Capacity Building Grant.

Gobabeb's annual programme for Grade 11 learners, the Youth Environmental Summit (YES), was planned for 27 April to 08 May 2020, targeting learners from the Hardap Region. The theme was "*Our Solutions are in Nature*". Contact was established with eight high schools as well as the office of the Director for Education in the Hardap Region, and planning for YES 2020 was well advanced. Lockdown regulations in response to the COVID-19 pandemic compromised this preparation, and it soon became clear that the event would not be able to take place as envisaged. With the authorities taking a wise and precautionary approach to safe schooling, we accepted that the traditional execution of YES in 2020 would not be possible.

Several alternative options for executing the YES were discussed internally, which considered *inter alia* different target groups sourced from a broader catchment area across the country to considering more mobile outreach efforts instead of a site-based learning experience. With due consideration also given to time-frame, budget, and Gobabeb's strengths and experience, we proposed an alternative that we believed was most feasible under the prevailing circumstances.

Thus, the 2020 YES diverted from the usual implementation format and was refashioned as a Research Methodology Internship (RMI) for 13 Namibian graduates. The internship programme was held from 22 July to 02 October 2020 and investigated household plastics consumption in Namibia. The overall research goal was to assess the effectiveness of the plastic bag levy in reducing plastic waste in designated centres, and to understand some of the key drivers of plastic pollution in the country. The programme furthermore served to train graduates in applied research approaches while enhancing skills in critical thinking, problem-solving, and the presentation of research results. The training was given by staff members from Gobabeb, with specialist support from international plastics experts from the University of Plymouth in the UK, with inputs from project partners, giz-BMCC II and MEFT.

The participants carried out consumer surveys in major urban centres of five regions to assess public knowledge, perceptions and attitudes towards the plastic bag levy and plastic bag pollution in Namibia. Survey results were supported by observations conducted within shops as well as along streets.

Key findings from the consumer survey conducted in Katima Mulilo, Ondangwa, Windhoek, Keetmanshoop and Walvis Bay were that although most respondents were aware of the levy, there was limited understanding as to the reasons for its implementation. It also appears to be having negligible effect as the demand for single-use plastic bags by shoppers remains high. Plastics are the largest component of waste generated in households across Namibia, irrespective of region or economic status; and other sources of single-use plastics should be addressed in the same way as shopping bags. Most respondents are aware of plastic pollution in their respective areas, but in general were reluctant to assume personal responsibility to effect change.



Talking about plastics on NBC's *Good Morning, Namibia*: 02 October 2021

Preliminary results of the study were communicated through a face-to-face presentation in Windhoek, with an option for virtual participation. Other platforms are being considered for further dissemination of the results. A more intensive analysis of the dataset is planned, and these results will be made available through scientific vehicles like publications and conference proceedings. Ultimately, the information generated through this programme will serve as a baseline to i)

assess and manage plastic pollution in Namibia, particularly regarding single-use plastics; and ii) identify the barriers for the effective implementation of the plastic bag levy. It will be of value to local authorities and regulators, communities and environmental managers to understand human behaviours leading to plastic pollution.

The training programme further delivered on building capacity in 13 graduates, who are now better equipped and confident in survey and observational techniques, and have enhanced skills in research design, execution, analysis and presentation. These well-rounded young professionals will be able to leverage this training opportunity to boost their credentials as they enter a very competitive job market.



RMI participants assessing plastic waste in //Kharas

Gobabeb, in partnership with United Nations Development Programme (UNDP) and MEFT, initiated a new annual educational outreach programme on climate change and its local impacts called *Climate Action for Millennials Programme* (CAMP).



By design, the specific focus of each training iteration will change so that after the full implementation period a suite of different topics that comprehensively cover climate change issues will have been addressed. The first CAMP was conducted in January 2021 with the theme 'Science of climate change and local resilience'. Emphasis was placed on the fundamental value of robust scientific data to underpin climate change projections and coping strategies at the local level. Eleven recent graduates from across the country received two weeks of intensive, science-based training on current climate change matters at Gobabeb. Training modules were delivered by Gobabeb staff, as well as invited local and international experts, via face-to-face and Zoom lectures. Long-term weather data sets provided by the Namibia Meteorological Service were processed and interpreted as a practical exercise. Using all the information gathered over the intense two-week programme, the participants developed their own outreach products (a set of four posters – page 18) and the teaching skills to transfer knowledge gained to an estimated 1 650 senior secondary school learners from 44 schools across Namibia.



CAMP participants at Gobabeb

Regarding professional training to stakeholders, SU staff were provided follow-up training on monitoring protocols by the NERMU team, particularly on the occurrence of *Petalidium* sp. around the Waste Rock Dump. Previously, training focused on the scientific method, planning and executing a field campaign, data collection, data capture and cleaning. The training was concluded by

teaching staff data analysis using geographic information systems.

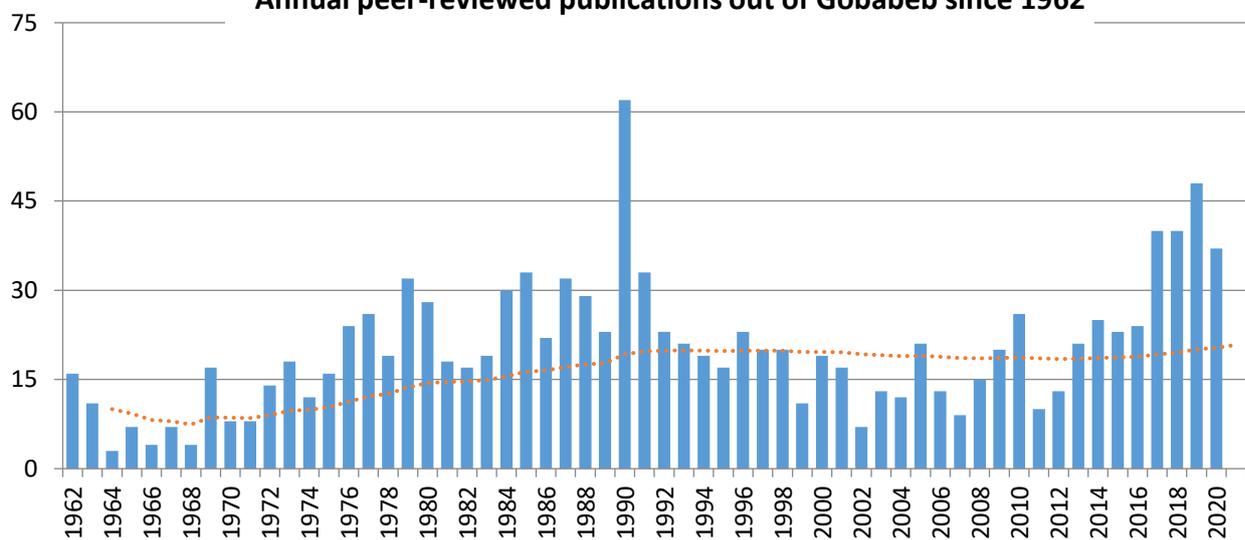
improve public awareness of processes, trends and measures to deal with emerging issues.

Publications

Gobabeb closely monitors peer-reviewed publications that explicitly acknowledge the institute, or are produced by our staff, as a widely accepted, objective metric of research output and activity. By this bibliometric standard, Gobabeb is continuing to be productive. The 37 scientific articles published during 2020 builds on a tradition of academic excellence established over the previous seven

Gobabeb’s visibility on the Internet continues to grow – visit www.gobabeb.org to consult our updated site. With new profiles of student associates, information about projects and research output, we are moving closer to our ideal of this site representing a vibrant, productive research facility. Our webmaster, Prof. Scott Turner, kindly maintains and further develops this site. Gobabeb is also a presence on other social media platforms like YouTube; Twitter; Facebook; TripAdvisor; and Instagram.

Annual peer-reviewed publications out of Gobabeb since 1962



years. In addition, seven theses based on data collected at Gobabeb, six of which were Master dissertations, including three of Gobabeb’s own staff, were submitted to various universities.

Visitors

Opportunities to share information with the public was limited due to national and international pandemic measures. Meetings were cancelled or transformed into virtual events, which people at Gobabeb find difficult to attend due to limited bandwidth. A two-page, full-colour profile of one of our researchers (Ailly Nambwandja) appeared in a local newspaper (*Die Republikein*). As previously reported, Gobabeb also produced a number of posters on climate change to

Gobabeb hosted 103 general visitors during the period, a reduction of 86% in comparison to the previous year. Almost 70% of these visitors were from Namibia or South Africa. Only eleven scientists, of which seven were Namibian, came to Gobabeb to conduct research. Despite rescheduling prospective visits several times, no school or university groups were able to visit Gobabeb after travel restrictions were imposed. Just before these measures were announced, in March 2020, 19 learners from the Windhoek International School were educated on desert ecology at Gobabeb. Even after local lockdowns eased, Gobabeb could not complete with more exotic tourist destinations

that were offering 'once-in-a-lifetime' specials for Namibians. These visitor statistics indicate the extraordinary impact that the COVID-19 pandemic and the associated travel restrictions had on the hospitality, tourism and educational sectors throughout Namibia and elsewhere in the world.

Gobabeb did sign up and provide promotional material for the African Geographic Club platform to promote tourism on the continent, with a percentage of lodge income earmarked to support conservation and organisations like Gobabeb. The launch of this initiative has been delayed, but it may hold benefits for the institute once travel normalises across the world.

With the industry in difficulties, it may not be the ideal time to try and activate Gobabeb's tourism concession, particularly specific developments in the current form of the Head Concession Agreement.

Prospective partners/operators have indicated that they are in a process of resetting their businesses, due to a significant reduction in income, and would not be immediately searching to expand their operations. This hiatus, however, offers an opportunity for Gobabeb to better understand emerging requirements of tourists post-COVID, so that we can market and attract niche travellers who may desire the isolation, space and outdoor activities afforded by a Gobabeb destination.

Infrastructure

Welcome progress was made during the year towards upgrading the living quarters of research associates and interns through the long-awaited implementation of the Namparks V initiative of the KfW and MEFT. This programme has committed to building eight accommodation units suitable for single Masters and PhD researchers at Gobabeb.

Further progress was made to improve and refurbish infrastructure at Gobabeb. In association with the Université Paris Est Creteil,

France, and North-West University, South Africa, a shipping container was acquired as a storage facility and a storeroom was refurbished as an atmospheric sciences laboratory.

A welcome intervention in the final stages of the giz Biodiversity Management and Climate Change (BMCC II) project allowed Gobabeb to address a range of issues to improve core facilities and essential maintenance. Though none of the problems were critical limitations to the institute's operations, they did affect productivity.

A range of relatively minor electrical issues were plaguing operational efficiency, none of them urgent or large enough to justify contracting a qualified electrician, but in combination required considerable work. Electrical system improvements included:

- Replacing damaged wires, installing additional power outlets, and installing dedicated high-demand electrical conduits for drying ovens and furnaces in Gobabeb's laboratories;
- Tracing and replacing faulty wiring in living and training areas;
- Rewiring and installing additional distribution boxes and breaker switches for improved power distribution and management;
- Replacing *ca.* 65% of the more energy demanding fluorescent tubes and bulbs with low-energy LED lighting systems, and training Gobabeb's technical team to continue gradual replacement of such lights. This has reduced energy demand at night by *ca.* 25%;
- Replacing single wall electrical outlets with multiple outlets and installing new electrical outlets throughout the administration block, thus reducing the need for adaptors and extension cables. This was necessitated by the exponential increase of electrical-powered office and research devices since the buildings were initially constructed in the 1970s;

- Installing timer switches on dedicated power outlets for refrigerators, thus allowing decreasing the power demand at times during the night when conditions are cool

Other giz-BMCC II support allowed Gobabeb to modify and install climate control in the ICT tower/hub. The host of electrical ICT equipment in the tower continuously produce heat, which, together with outside radiation, often results in conditions above 45°C that causes equipment to go into preventative shutdown or catastrophic failure. Research on potential passive cooling during 2019 showed that passive cooling is unlikely to succeed and that an energy efficient climate control system is a better solution.

Linked to resolving climate issues degrading ICT performance, the giz-BMCC II also supported replacing the long obsolescent server and back-up hardware with a modern network attached storage (NAS) system. The replacement system not only increased network data access and storage by some 500% as is required for by modern, high-performance and data intensive research and monitoring equipment, but also improved rapid access to data files by researchers, improved cloud data storage, improved data backup and security, and remote access by Gobabeb's ICT advisor (in Walvis Bay providing *pro bono* service).

The giz-BMCC II also shared Gobabeb's concerns about leaks in the iconic water tower at Gobabeb. Although constructed with reinforced concrete, continuous leaking of the corrosive water into the structure will allow the structure to slowly deteriorate. A previous attempt by Gobabeb to apply waterproof sealing to the inside of the tower failed. With the support of the giz-BMCC II project, Gobabeb therefore consulted with suppliers and ordered a bespoke waterproof lining for the water-tower to be designed and manufactured in South Africa. Once installed, this lining will prevent leakage and continuous weakening of Gobabeb's iconic structure. However, despite regular follow-up, the lining has not yet been delivered to Gobabeb to allow installation.

Gobabeb's swimming pool has been out of commission for several years due to small cracks and a need for resealing. Though not an operational priority, the pool is integral to providing recreational escape for the mental well-being and improving morale of Gobabeb staff. The voluntary involvement of Gobabeb's research staff over weekends and after hours to remove decades of algal and carbonate crust, as well as the underlying paint, in order to allow proper preparation and resealing of the pool, indicated the importance of this recreational feature. Bespoke support from MEFT allowed a comprehensive overhaul and refurbishment of the pool area. After preparation and resealing, new tiles to improve safety around the pool edges, a chlorine generator to address the problems of semi-saline water, repainting of the pool area, and a pebble boundary to reduce sand and dust migration was carried out. Although the pool has been re-commissioned, renovations are continuing.

One of the major global transformations caused by the COVID-19 pandemic was an extraordinary demand for virtual conferencing and consultation, home office engagement and remote access to data and monitoring equipment. Gobabeb has already been under strain due to limitations on bandwidth and ICT connectivity due to its reliance on satellite communications and suitable advice and guidance from service providers. The service that Gobabeb receives is at best adequate, which is severely limiting its ability to engage internationally and provide the broadband access that its international partners take for granted. The pandemic only served to highlight how much of a disadvantage and handicap inadequate ICT systems impose on research and educational services in developing countries. As Gobabeb is nearing the end of its existing contract period for internet services, it started evaluating alternative options. Most internet service providers expect Gobabeb to accept their promised services and enter into a contract agreement before installing equipment, but Telecom Namibia agreed to provide a trial installation for testing purposes. Although of considerably lower bandwidth as what is promised under contract, the trial

installation is performing above expectation and is more convenient. Gobabeb will therefore not renew its current contract for internet connectivity with iAfrica as a service provider.

Gobabeb decided to dispose of one of its vehicles, a Ford Ranger that has been out of commission for more than two years. It was difficult to obtain parts for the vehicle, and its condition was as such that it was too unreliable to even use as a site vehicle. As it was just taking up parking space, it was sold as is to a willing buyer and removed as a Gobabeb asset.

NUST decommissioned an all-terrain excursion truck that had been used for decades, but was still in good running condition. Rather than dispose of the vehicle at auction, the truck was donated to Gobabeb to be used as transport of training groups. The Mercedes truck, outfitted as a field bus, is a useful addition to the Gobabeb fleet and proved very useful to transport large groups of students and staff during the various training events in the past year. Future plans would be to get the vehicle outfitted and registered as a mobile field laboratory once funds can be secured for that purpose.

Despite the advances made during the past year, the aging infrastructure at Gobabeb remains of major concern. Two of the gridfeeders for the solar array failed during the year. One gridfeeder overloaded and caught fire, which was fortunately noted in time to prevent more extensive damage. That gridfeeder could be replaced through an insurance claim, while the other display used for adjusting settings in the other gridfeeder could be replaced by using old parts. However, the electrical control system of the main trickle filter is failing and needs to be jury-rigged to continue operations. A complete overhaul and refurbishment of that trickle filter will become a major priority in the near future. Gobabeb also made some advances in its solid waste management system. Fencing around the solid waste area was improved and better separation into recyclable and other waste introduced to improve the system.

Despite the continuing focus on improving preventative maintenance and immediate attention to critical needs, the overall age of the infrastructure at Gobabeb necessitates continued attention which is ill served by deputising the office and research managers to carry specific maintenance responsibilities. Despite the financial risk, Gobabeb therefore appointed a site supervisor to help ensure a functional and safe environment for staff and visitors. However, it remains problematical to allocate or raise sufficient funds for refurbishment of centre infrastructure and meeting the need for new infrastructure. Despite the welcome relief of new accommodation for interns and single researchers by the NamParks V intervention, Gobabeb still need to prioritise additional office space and more accommodation for staff (e.g., kitchen staff, short-term interns and senior visiting scientists).

The only major outstanding maintenance issue carried over from previous years is to replace the petrol tanks. The problems identified when commissioning the second trickle Filter, i.e., poorly planned sewerage sumps and pipelines that does not allow for smooth flow of waste will require large-scale replanning and reinstallation of infrastructure that is currently not financially feasible. Minor damage to Trickle Filter 2 pipelines and tanks was incurred by exceptionally high floods of the Kuiseb River in January 2021, the highest since 2011. More severe damage was prevented due to the precautionary construction of a gabion barrier during 2018 and 2020. An evaluation of maintenance requirements early in the year identified additional maintenance requirements for existing buildings. These includes resealing and repainting all roofs of the administrative centre and staff houses; urgent termite control measures in the villas; repairing and repainting all exterior walls; retiling floors in parts of the administration block and some of the staff houses; further refurbishment and improvements to staff recreational facilities, and replacing and repainting corroded solar support structures.

CLIMATE CHANGE

"Hope is not lost"

What is climate?
Average weather in a given area over a long period of time

What is climate change?
A long-term shift in global climate patterns (>30 years)

What causes climate change?

Natural factors?
Such as volcano eruptions, or orbital variation

or Human activities?
Such as burning of fossil fuels and deforestation etc., causing an increase in CO₂ and other greenhouse gas levels.

The main aspect of climate change
A rise in average global temperature (global warming)

Atmospheric carbon dioxide and Earth's surface temperature (1880-2019)

Global Warming since the late 19th Century (°C)

UNDP, CAMP, GOBABEB

Impacts of Climate Change on Temperature

"It's getting hot out there"

Trends in average air temperature across Namibia

Average Maximum temperature (red line), Average Minimum temperature (blue line)

Increased Minimum Temperature Impacts

- Warmer winters
- Changes in insect life cycles
- Outbreaks of diseases

Increased Maximum Temperature Impacts

- Dehydration
- Plant mortality
- Reduced productivity

UNDP, CAMP, GOBABEB

The Impacts of Climate Change on Rainfall

"Don't let 2030 be 20-thirsty"

An increase in temperature causes an increase in the rate of evaporation, resulting in an increase in the frequency of both severe droughts and extreme floods.

Annual rainfall patterns observed in Namibia

Impacts

Drought, Relocation, Health, Floods

UNDP, CAMP, GOBABEB

Mitigation and Adaptation

"Be the change you want to see"

Climate change can not be prevented but we can reduce the impacts on future generations by becoming environmentally aware.

Mitigation
How to reduce the severity of global change

Renewable Energy, Waste Management, Reforestation, Advocacy

Adaptation
How to live in a changing climate

Climate-smart agricultural practices, Become energy efficient, Become water efficient

What can YOU do?

UNDP, CAMP, GOBABEB

Posters produced by CAMP participants for learner outreach throughout Namibia

Plans for the Future

The following initiatives outline the key elements within the organisational plan for 2021/2022 and onwards, the COVID situation permitting:

Research

- Develop new partnerships to expand Gobabeb's research network and secure science funding from additional, novel sources;
- Explore joint initiatives with UNAM, NUST and other tertiary training institutions in southern Africa, for science education and research;
- Encourage and monitor scientific and societal impacts of research endeavour, i.e., through numbers of scientific publications, public presentations and multimedia tools;
- Improve functionality of laboratories and acquire field research equipment;
- Establish an ethics committee and implement a code of research ethics, aligned to international professional standards;
- Develop research priorities and budgets, under the ambit of the strategic plan.

Training

- Continue to implement the capacity building sustainability strategy through, for example, increased involvement of alumni in training programmes;
- Continue to integrate research and training functions to optimise human resources;

- Maintain and expand the customer base for existing training interventions; while developing and promoting innovative tertiary level offerings;
- Secure multi-year resource streams to sustain flagship training offerings, e.g., SDP, GTRIP, YES, CAMP and annual training to benefit the local primary school in Utuseb;
- Explore new opportunities to develop and implement MOOC (Massive Open Online Courses) training interventions;
- Develop information material and implement targeted activities to promote and market the Namib Desert;
- Expand and populate Gobabeb's website to adequately reflect and promote our core business;
- Promote opportunities and develop relationships with local and regional universities to facilitate postgraduate studies for Namibian students.

Organisational development

- Explore priority activities to secure adequate and diversified funding to implement Gobabeb's five-year Strategic Plan relating to its core business;
- Continue to improve the financial management system and refine management information reporting systems;
- Continue efforts to formally operationalise Gobabeb's Tourism Concession;

- Improve customer service and ecotourism experience to increase bed occupancy;

Infrastructure

- Develop a site master plan for future expansion, with specific reference to staff accommodation and office facilities;
- Develop priorities for the maintenance and upgrading of Gobabeb's infrastructure, with reference to long-term maintenance records and planning;
- Further upgrade the solar energy system, efficient energy use and cost recovery measures;
- Overhaul and refurbish waste management system;
- Refurbish recreational area, including tennis/volleyball court;
- Upgrade ICT system and options to improve access to and functionality of internet facilities;
- Develop and implement an ICT hardware and software replacement plan.
- Develop expenditure strategy for urgent building and infrastructure maintenance, with specific reference to replacing and repainting roofs and exterior surfaces;
- Develop and explore vehicle replacement plan.



Staff (as of 01 March 2021)

Staff on the Establishment

Executive Director	Dr Gillian Maggs-Kölling
Office Manager	Ms Elna Irish (part-time)
Accountant	Ms Ileni Hiwilepo (part-time, off-site)
Research Manager	Dr Eugene Marais
Senior Researcher	Ms Elbe Brunette (off-site) ¹
	Ms Saima Shikesho ²
	Ms Jessica Roberts ³
Junior Researcher	Mr Martin Handjaba ⁴
Training Coordinator	Ms Kapandu Shihepo
Site Management	Mr Kokkas Smit (from 01 November 2020)
Receptionist/Hospitality	Ms Leena Kapulwa
Cleaner	Ms Linda Bees
	Ms Selma Swartbooi
	Ms Rita Swartbooi
Technical Team	Mr Josef Gariseb
	Mr Samuel Gowaseb
	Mr Richardt Swartbooi
	Mr Jeffrey Khurisab

¹ PhD Natural Resource Science, NUST (completion 2021), *Evaluation of human-induced water stress in riparian trees in the central Namib Desert.*

² MSc Biological Sciences, University of Cape Town (completion December 2020), *!Nara (Acanthosicyos horridus) seed dispersal by black-backed jackals (Canis mesomelas) and gerbils (Gerbillurus spp.) in the central Namib Desert.*

³ MSc Zoology, University of Pretoria (completion December 2020), *Thermoregulatory behaviour and microhabitat use by Dune Larks in the Namib Sand Sea.*

⁴ MSc Environmental Sciences, North-West University (projected completion December 2021), *The influence of thermal conditions on the surface activity of two endemic gerbil taxa in the Namib Desert.*

Post-graduate student associates, on-site

Mr Ndelimona Ipinge, MSc candidate, UCT (January 2020 – December 2021), *Habitat use and resource partitioning by the Namib Golden Mole (Eremitalpa granti namibensis Bauer & Niethammer, 1959).*

Ms Ailly Nambwandja, MNRM candidate, NUST, (June 2019 – July 2021), *The use of multispectral UAV imagery for monitoring lichen responses to fog and disturbances, Central Namib.*

Mr Natanael Ndilenga, MSc candidate, University of Stellenbosch (January 2020 – December 2021), *Pollination biology and demography of Welwitschia mirabilis in the Namib Desert, Namibia.*

Ms Leandri Wessels, MSc candidate, NWU (February 2020 – December 2021), *Thermo-topographical influences on biological soil crust composition along a fog gradient in the central Namib Desert.*

Mr Brendan Luyanda, MSc candidate, UNAM Katima Mulilo (November 2020 – December 2022), *Habitat suitability and species delimitation of barking geckoes in the central Namib desert.*

Ms Ndapandula Shihepo, MNRM candidate, NUST (January 2021- December 2022), *Perceptions and behaviour of consumers regarding the introduction of the plastic bag levy in Namibia.*

GTRIP intern 2020 (January – July)

Ms Noita Josob, NUST-WIL, *An analysis of household use of forest resources in the Lower Kuiseb, Namib-Naukluft Park.*

GTRIP intern 2021 (March – July)

Mr Andreas Lwiinga, NUST-WIL, *Wind as a seed dispersal agent of plants in the central Namib Desert.*

Short-term Interns

Mr Eric Norton, HWC Research intern, June – October 2020, South Africa

On-site caterer (Outsourced Service Provider)

Mr Hendrik Adams

NERMU PI / Research Associate

Prof. Theo Wassenaar, NUST – PI, NERMU (Namib Ecological and Restoration Monitoring Unit)

NERMU post-graduate student associates, off-site

Ms Paulina Fendinat, PhD in Natural Resource Science, NUST (registered December 2019). *The ecohydrology and physiological response of the Namibian desert plant Welwitschia mirabilis within the context of land-use changes and climate change.*

Mr Jonas Lipopela, MNRM, NUST (registration 2019, completion December 2020). *Using ecological niche modelling to evaluate environmental and anthropogenic threats to the Husab sand lizard (Pedioplanis husabensis) in the central Namib Desert.*

Mr Hallelujah Shaanika, MNRM, NUST (registration 2018, completion June 2020). *Assessing the likelihood that burrowing gerbils in the central Namib are ecological engineers.*

Part-time NERMU field assistants

Mr Leonard Mandume

Mr Wilbard Mutewa

External Post-graduate students associated with Gobabeb

Mr Francois Becker, PhD, University of Witwatersrand, RSA (registration 2018). *A taxonomic and phylogenetic revision of the genus Ptenopus (Reptilia: Gekkonidae).*

Mr Robert Logan, PhD, Michigan State University, USA (completion 2021). *Photo-degradation in the Central Namib.*

Ms Bryn Morgan, PhD, University of California Santa Barbara, USA (completion 2023). *The dynamics of ephemeral river systems within the hyperarid Namib environment – Fulbright Scholar.*

Ms Rosa-Stella Mbulu, Universities of Cologne and Bonn, Germany (completion 2023). *The effect of extreme aridity and habitat fragmentation on evolutionary processes in the Namib Desert.*

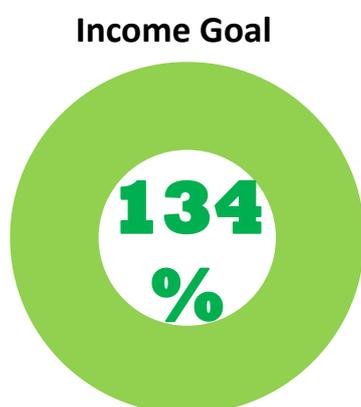
Financial Overview

The 2020/21 audit report again raised the issue of whether Gobabeb is a going concern. Going concern is defined as “the ability of the entity to continue operating in the next 12 months, its ability to meet its obligations and not facing any threat of liquidation.” This was largely prompted by an ongoing decline in sources of income and lack of diversification in income streams for Gobabeb, exacerbated by the COVID pandemic.

The management team at Gobabeb is more aware than ever as to the precarious financial position of the Trust. As Gobabeb operates under a specific mandate and the terms and conditions of a collaboration agreement, there are limited remedial measures to improve the situation beyond strict fiscal measures and attempting to secure more funding for projects – both of which have already been instituted.

Gobabeb has implemented ongoing fiscal tracking to measure its ability to continue operating. A view from our Dashboard at the end of FY20/21 follows; this tool allows us to routinely monitor that our expenditure discipline is always informed by income received, within the annual budgetary projections.

Total Expenditure **\$4,544,179**
Total Income **\$5,774,972**



An extraordinary degree of effort was put into exploring additional sources of income together with various partners. Gobabeb could remain competitive by reducing fees for accommodation and meals, while it also explored bespoke offerings for domestic ecotourism in association with Uri Adventures. However, most of the income received was from delayed payments from the previous financial year or debt recovery.

At the first signs of global concerns about the emergence of COVID-19 and the associated restrictions on international travel, Gobabeb took precautionary measures by revisiting its annual budget and implementing strict fiscal tracking. Provision was made for two scenarios; severe measures if minimum income required salary reductions and project termination to allow phased downscaling or closure; and less severe measures where new projects allow some economic easing. Gobabeb's management team recognised that some cost projections needed fluidity to adjust to project and service demands. The table below illustrates the results of tracking measures that were introduced to better understand institutional expenditure.

Expenditure Tracking		
Budget Category	% of projected budget	% of realised costs
Remuneration	98.9%	58.4%
Subsistence & Travel	55%	1.5%
Consumables	133.5%	3.9%
Maintenance	118%	3.6%
Utilities	86.5%	3%
Transport	126.5%	4.5%
Services	236%	21.6%
Asset Acquisition	160.5 %	3.5%

Income declined by 35.8% from the previous year, though recovery of outstanding accounts from the preceding fiscal year provided welcome relief. Actual expenditure remained relatively stable, decreasing by 2.5%.

However, it has to be considered that a consequence of the strict expenditure control is an increasing maintenance and obsolescence debt if aging equipment is not replaced and major preventative maintenance is postponed.

The primary component that sustains Gobabeb's income remains its knowledge assets, essentially its staff. People are Gobabeb's most valuable asset as they are fundamental to sustaining our major sources of income. Prioritising the retention and maintenance of a knowledgeable staff complement that can support research on a broad range of disciplines relevant to the Namib Desert, are thus a core principle to Gobabeb's fiscal approach.

This was resoundingly underscored during the 2020/2021 fiscal year as funding for projects contributed 58.6% of all income received, while the provision of accommodation, meals, and technical support declined drastically to only 25.4% of total income in comparison to more than 52% of total income in the previous year.

Project and service income was derived from nine on-going projects and signed service agreements, of which one was new. The largest project in terms of funding during the financial year was the NERMU project to support the Swakop Uranium Biodiversity Programme. The bulk of the funding for that project is, however, tied to direct expenditures for execution of the agreed services.

A major part of the funds received by Gobabeb was for capacity building through bespoke and *ad hoc* training programmes. The primary capacity building projects consisted of:

- Research Methodology Internship – funded through giz-BMCC II and MEFT
- Climate Action for Millennials Programme - funded through the SEMER project of UNDP & MEFT
- Diverse post-graduate student support initiatives

MEFT contributed N\$ 300,000 towards the annual expenditure of both capital investment and maintenance of infrastructure, which was a welcome doubling of the previous year's allocation. The major commitment was still towards upkeep and repairs of facility installations. However, N\$ 150,000 of this allocation was invested in the refurbishment of the swimming pool, which had been out of commission for two years. This decision was based on improving visitor experience in future, but mainly in consideration of staff well-being, particularly during COVID isolation.

The overall financial situation of Gobabeb remains extremely challenging. There were very few opportunities to propose or to initiate new research and capacity development initiatives. Despite the prospects for some post-pandemic recovery, the pandemic's global economic impacts are likely to continue having an impact on the institute's long-term prospects.

The Annual Report for the Gobabeb Trust, set out on the preceding pages, was approved by the Chairman on 04 December 2021 and is signed on behalf of the Trustees as below.

Report of the Trustees signed by:



Teofilus Nghitila
Chair

Annex I. Research Bibliography for 2020

Peer-reviewed journal articles

- Abreu, E.F.M., Canhoto, P. & Costa, M.J. 2020. Development of a clear-sky model to determine circumsolar irradiance using widely available solar radiation data. *Solar Energy* 205: 88–101, <https://doi.org/10.1016/j.solener.2020.05.010>
- Adhikari, B. & Wang, L. 2020. The potential contribution of soil moisture to fog formation in the Namib Desert. *Journal of Hydrology* 591: 125326 ; <https://doi.org/10.1016/j.jhydrol.2020.125326>
- Barrientos, C., Estay, J., Barra, E. & Muñoz, D. 2020. Calibration of the SSOT mission using a vicarious approach based on observations over the Atacama Desert and the Gobabeb RadCalNet station. *ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences* V-1-2020: 133–140, https://doi.org/10.5194/isprs-annals-V-1-2020-133-2020_2020.
- Bègue, N., Shikwambana, L., Bencherif, H., Pallotta, J., Sivakumar, V., Wolfram, E., Mbatha, N., Orte, F., Du Preez, D.J., Ranaivombola, M., Piketh, S., & Formenti, P. 2020. Statistical analysis of the long-range transport of the 2015 Calbuco volcanic plume from ground-based and space-borne observations. *Annales Geophysicae* 38(2): 395–420; <https://doi.org/10.5194/angeo-38-395-2020>
- Carter, A.J., Baniel, A., Cowlshaw, G. & Huchard, E. 2020. Baboon thanatology: responses of filial and non-filial group members to infants' corpses. *Royal Society Open Science* 7: 192206; <http://dx.doi.org/10.1098/rsos.192206>
- Chakrabarti, U., Paoli, R., Chatterjee, S. & Megaridis, C.M. 2019. Importance of body stance in fog droplet collection by the Namib Desert beetle. *Biomimetics* 4(3): 59; <https://doi.org/10.3390/biomimetics4030059>
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Dissertations

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- Monagle, C. 2020. *The geochemistry and impacts of chemical weathering on the central Namib Desert gravel plains soils*. B.S. thesis Earth Sciences, Ohio State University.
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- Roberts, J. 2020. *Thermoregulatory behaviour and microhabitat use by Dune Larks in the Namib Sand Sea*. M.Sc. thesis Zoology and Entomology, University of Pretoria.
- Shabaan, D.H. 2020. *'Allelofertile' soil islands self-conditioned by Welwitschia mirabilis in the Namib Desert*. M.Sc thesis. Biological and Environmental Sciences and Engineering, King Abdullah University of Science and Technology.
- Shaanika, H.N. 2020. *Assessing the likelihood that burrowing gerbils in central Namib can be ecological engineers*. M.Sc. thesis Natural Resource Management, Namibia University of Science and Technology.
- Shikesho, S.D. 2020. *Seed dispersal by Black-backed Jackals (Canis mesomelas) and hairy-footed gerbils (Gerbillurus spp.) of Inara (Acanthosicyos horridus) in the Central Namib Desert*. M.Sc. thesis Biological Sciences, University of Cape Town.

List of Abbreviations and Acronyms

AWS	Automatic Weather Station
BMCC II	Biodiversity Management and Climate Change II Project
BNRM	Bachelor in Natural Resource Management
BPFM	Biophysical Field Methods
CAMP	Climate Action for Millennials Programme
CEO	Chief Executive Officer
COVID-19	Coronavirus Disease 2019
DRFN	Desert Research Foundation of Namibia
giz	Deutsche Gesellschaft für Internationale Zusammenarbeit
GTRIP	Gobabeb Training and Research Internship Programme
HDC	Higher Degrees Committee
HWC	Human-Wildlife Conflict
ICT	Information and Communications Technology
KfW	Kreditanstalt für Wiederaufbau
MEFT	Ministry of Environment, Forestry and Tourism
NAS	Network Attached Storage
NamParks	Namibia National Parks Programme
NCRST	National Commission on Research Science and Technology
NERMU	Namib Ecological Restoration and Monitoring Unit

NGO	Non-Governmental Organisation
NNNP	Namib-Naukluft National Park
NUST	Namibia University of Science and Technology
NWU	North-West University, South Africa
PPE	Personal Protective Equipment
RMI	Research Methodology Internship
RSA	Republic of South Africa
SASSCAL	Southern African Science Service Centre for Climate Change and Adaptive Land Management
SDP	Summer Drylands Programme
SEMER	Sustainable Environmental Management and Enhanced Resilience
SU	Swakop Uranium
UAV	Unmanned Aerial Vehicle
UCT	University of Cape Town, South Africa
UK	United Kingdom
UNAM	University of Namibia
UNDP	United Nations Development Program
UP	University of Pretoria, South Africa
US	University of Stellenbosch, South Africa; United States [of America]
WIL	Work Integrated Learning
YES	Youth Environmental Summit

Legal and Administrative Information

Registered Office

Gobabeb – Namib Research Institute
Kuseb River Road, D1983
Namib-Naukluft National Park
P.O. Box 953
Walvis Bay, 13300
Namibia
Telephone: + 264 64 694199
Fax: + 264 64 694197
Email: gobabeb@gobabeb.org
Website: www.gobabeb.org/

Bankers

First National Bank Namibia
Branch: Coastal Walvis Bay
138 Sam Nuyoma Avenue
P.O. Box 1
Walvis Bay
Namibia
Telephone: + 264 64 2018218
Fax: + 264 64 2018231
SWIFT code: FIRNNANX
Website: www.fnbnamibia.com.na/

Auditors

Stier Vente Associates
Chartered Accountants
Practice Number 9633
50 Olaf Palme Street
P.O. Box 90001
Klein Windhoek
Namibia
Telephone: + 264 61 264440/264460
Fax: + 264 61 264490

Trust Administrators

Ellis Shilengudwa Incorporated
1st Floor, 1@Steps Offices,
c/o Grove & Chasie Streets
Kleine Kuppe
P.O. Box 3300
Windhoek
Namibia
Telephone: + 264 61 242 224
Fax: + 264 61 242 226
Website: www.esinamibia.com/

P.O. Box 953
Walvis Bay
Namibia

T: +264 64 694 198
F: +264 64 694 197
www.gobabeb.org/

