Renosterveld

ecosystem management plan: western cape

Prepared for:

Western Cape Conservation Stewardship Association (WCCSA) & CapeNature

By:

The Nature Conservation Corporation

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This Ecosystem Management Plan forms part of a set of 7, with an EMP Guide Tool for the implementation of these, all available from C.A.P.E. at Kirstenbosch, Cape Town.

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introduction

Renosterveld has long been the least understood component of the Fynbos Biome, with very little known of its functioning and ecological requirements. It is, however becoming increasingly appreciated for its uniqueness and high species diversity, especially geophytes. The perception of it being useless renosterbosveld is changing and hopefully not too late. Most renosterveld types are under serious threat from agriculture especially, having been transformed into vineyards and orchards.

Many land users do not realise how vulnerable this vegetation is to transformation through incorrect use of fire and overgrazing as well as fragmentation across the landscape. Some renosterveld types can be valuable, if correctly managed, as natural rangeland.

Now more than ever do we need to realise the value of this mysterious jewel. In this Ecosystem Management Plan, we present pragmatic solutions to management issues and we hope to promote appreciation and cultivate custodianship of this globally unique, threatened ecosystem.

ecosystem description

landscape features

Renosterveld is generally a vegetation of the mid-elevations i.e. the area between the foot of the high mountains and actual foreland flats. Renosterveld is found on fine grained substrates that are more nutrient rich. These substrates may be alluvial in origin but generally they are derived from shale, granite, silcrete or exceptionally, limestone.

The shale substrates are found on undulating hills and plains and broad valley floors. Silcrete is found as scattered patches on hilltops, occasionally on flats as well and is easily recognised by the presence of cobbles and pebbles. The alluvial substrates occur in valley bottoms, riverine plains and as alluvial fans.

vegetation description

The table below lists the vegetation units incorporated in this Renosterveld Ecosystem Management Plan. Vegetation units highlighted are those sampled during the biodiversity and management assessment programme.

Table 1 List of Renosterveld Vegetation Units in the Western Cape Province

Reference [1]	VEGETATION TYPES & UNITS	Status [2]	Target [3]
	Shale Renosterveld		
FRs 1	Vanrhynsdorp Shale Renosterveld	LT	27%
FRs 3	Roggeveld Shale Renosterveld	LT	27%
FRs 4	Ceres Shale Renosterveld	VU	27%
FRs 5	Central Mountain Shale Renosterveld	LT	27%
FRs 6	Matjiesfontein Shale Renosterveld	LT	27%
FRs 7	Montagu Shale Renosterveld	LT	27%
FRs 8	Breede Shale Renosterveld	VU	27%
FRs 9	Swartland Shale Renosterveld	CR	26%
FRs 10	Peninsula Shale Renosterveld	CR	26%
FRs 11	Western Ruens Shale Renosterveld	CR	27%
FRs 12	Central Ruens Shale Renosterveld	CR	27%
FRs 13	Eastern Ruens Shale Renosterveld	CR	27%
FRs 14	Mossel Bay Shale Renosterveld	CR	27%
FRs 15	Swartberg Shale Renosterveld	LT	29%
FRs 16	Uniondale Shale Renosterveld	LT	29%
FRs 17	Langkloof Shale Renosterveld	EN	29%
	Granite Renosterveld		
FRg 2	Swartland Granite Renosterveld	CR	26%
FRg 3	Robertson Granite Renosterveld	LT	27%
	Alluvium Renosterveld		
FRa 1	Breede Alluvium Renosterveld	EN	27%
FRa 2	Swartland Alluvium Renosterveld	VU	26%
	Silicrete Renosterveld		
FRc 1	Swartland Silicrete Renosterveld	CR	26%
FRc 2	Ruens Silicrete Renosterveld	CR	27%
	Limestone Renosterveld		
FRl 1	Kango Limestone Renosterveld	LT	29%

[1] Sourced from The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford 2006)

[2] **Conservation Status of vegetation units defined as** LT = Least Threatened; VU = Vulnerable; EN = Endangered and CR = Critically Endangered

[3] The national target for securing representative vegetation for its conservation

Renosterveld is an evergreen, fire-prone short to medium tall, mid-dense to dense shrubland dominated by cupressoid-leaved evergreen asteraceous shrubs with a well-defined understorey of shade tolerant herbs and bulbous plants. The patchy gaps are populated with a mixture of grasses, annuals and bulbous plants. Heuweltjies are frequently present and these support mid-tall bush clumps composed of mostly wild olive *Olea europaea* subsp. *africana*, candlewood *Pterocelastrus tricuspidatus* and blinkblaar taaibos *Rhus lucida*. If the vegetation is dominated by Proteaceae or Ericaceae or if there is more than 10% cover of Restionaceae, then it is not considered to be renosterveld, regardless if renosterbos *Elytropappus rhinocerotis* is present.

Due to the heterogeneity of the renosterveld vegetation units, brief structural descriptions will be given for those units actually visited during the course of this study.

FRs 6 Matjiesfontein Shale Renosterveld

De Doorns to Gamka Poort, north of the Groot Swartberg and south of the Great Karoo Basin

Low to medium tall, open to medium dense narrow-leaved shrubland dominated by renosterbos. Other major structural shrubs include wild rosemary *Eriocephalus ericoides*, klaaslouwbos *Athanasia flexuosa* and hanepootharpuis *Euryops multifidus*. Low-growing shrubs include bitterbos *Chrysocoma ciliata*. Grasses such as polgras *Ehrharta calycina*, knol ehrharta *E. capensis*, thatch grass *Hyparrhenia hirta* and *Pentaschistis rigidissima* are found between the shrub matrix. The geophytes are especially prominent in seasonally wet areas and drainage lines (e.g. red-hot poker *Kniphofia sarmentosa* and geel froetang *Romulea tortuosa* ssp. *tortuosa*).

FRs 7 Montagu Shale Renosterveld

Little Karoo especially between Montagu & Barrydale

A tall shrubland in a matrix of short divaricate shrubs dominated by renosterbos. Components of tall shrubland include blombos *Metalasia densa*, sand olive *Dodonaea angustifolia* and star-apple *Diospyros lycioides*. Shorter shrub matrix consists of amongst others draaibos *Felicia fillifolia*, vierkantperdekaroo *Oedera squarrosa*, witgatbossie *Pteronia pallens*, asbossie *P. incana,* slangbos *Seriphium plumosum* and gannasbossie *Passerina obtusifolia*. The understorey contains Cape weed *Arctotheca calendula* and kweek *Cynodon dactylon* amongst others. Geophytes are conspicuous, especially the yellow or orange chinks *Ornithogalum dubium*.

FRs 9 Swartland Shale Renosterveld

Swartland and Boland areas

Low to tall, narrow-leaved shrubland of varying cover as well as low, open shrubland in more arid or exposed sites. Heuweltjies are conspicuous and dominated by stunted sclerophyllous trees. Disturbed areas immediately recognisable by dominance of skaapbostee *Otholobium hirtum*, klaaslouwbos *Athanasia trifurcata* and thatch grass *Hyparrhenia hirta*. Narrow-leaved tall shrubs include katstert *Anthospermum aethiopicum*, harpuis *Euryops thunbergii*, geelgombos *Pteronia divaricata*. Lower growing shrubs include the ubiquitous renosterbos *Elytropappus rhinocerotis*, vaaltee *Plechostachys serpillifolia*, currybush *Helichrysum revolutum* and wild rosemary *Eriocephalus africanus*. The understorey is well developed with katbossie *Stachys aethiopica* and brandblaar *Knowltonia vesicatoria* prominent. Bulbous plants are well-represented with *Watsonia marginata* most conspicuous. Succulent shrubs including geel melkbos *Euphorbia mauritanica* and steenbok melkbos *E. burmannii* are commonplace. The grass component is also well-developed with rooigras *Themeda triandra* and caterpillar grass *Harpochloa falx* widespread.

FRs 11 Western Rûens Shale Renosterveld

Western Overberg: Villiersdorp to Napier

This is a low to medium tall, open to medium dense grassy cupressoid and small-leaved shrubland dominated by renosterbos. Other dominants in the shrublands are slangbos *Seriphium plumosum*, draaibos *Felicia fillifolia*, klaaslouwbos *Athanasia trifurcata* and vierkantperdekaroo *Oedera squarrosa* amongst others with bleek koeniebos *Rhus pallens* as a tall emergent shrub. Grasses are prominent e.g. kweek *Cynodon dactylon*, thatch grass *Hyparrhenia hirta*, rooigras *Themeda triandra*, polgras *Ehrharta calycina* and bokbaardgras *Merxmuellera strica*. Geophytes are prominent with many localised species e.g. poutulp *Moraea elegans*, *Sparaxis maculosa* and *S. fragrans.*

FRs 13 Eastern Rûens Shale Renosterveld

Eastern Overberg towards Riversdale

This is a low to medium tall, open to medium dense grassy cupressoid and small-leaved shrubland dominated by renosterbos. Very similar to FRs 11, except the geophyte component isn't as well developed. The succulent flora is diverse and there are well developed grasslands nearer to the Cape Fold Mountains where the rainfall is higher.

Succulents include bitter aloe *Aloe ferox* (dominant), diadem vygie *Trichodiadema pygmaeum*, *Haworthia marginata, H. heidelbergensis, H. mutica, H. serrata* and bontaalwyn *Gasteria carinata.*

FRs 15 Swartberg Shale Renosterveld

Northern slopes of the Groot Swartberg

A low medium dense cupressoid shrubland with an open grassy understorey dominated by renosterbos. Low shrublands contain kleinperdekaroo *Oedera genistifolia*, asbossie *Pteronia incana*, klaaslouwbos *Athanasia trifurcata*, skilpadteebos *Leysera gnaphaloides* and katbos *Ballota africana*. Dwarf shrubs include *Dianthus bolusii* and bosmagriet *Dimorphotheca cuneata*. Amongst the grasses polgras *Ehrharta calycina*, weeping lovegrass *Eragrostis curvula* and quaggagras *Karoochloa purpurea* are most frequent. Various thicket species are found in the valleys and at the base of the slope. These include false olive *Buddleya salvifolia*, sand olive *Dodonaea angustifolia*, blinkblaar taaibos *Rhus lucida*, gewonetaaibos *R. pyroides* and koeniebos *R. undulata*.

FRs 16 Uniondale Shale Renosterveld

Sebrasfontein to Uniondale

Low medium dense cupressoid shrubland with an open grassy understorey dominated by renosterbos. A similar vegetation unit to FRs 15, but with more succulents present e.g. kransaalwyn *Aloe perfoliata*, *A. microstigma* and skilpadkos *Glottiphyllum salmii.*

FRg 2 Swartland Granite Renosterveld

Swartland and Boland

A similar unit to FRs 9, but differing in having a more patchy matrix of grassland and herblands with the shrubs. When occurring on slopes and granite outcrops, it is noticeably different in terms of the patchiness associated with the groups of small trees around rocky outcrops and bulb and succulent gardens on the edges of exposed domes. The bulb flora is particularly well-developed and includes *Lachenalia* (*L. pustulata* & *L. aloides*), *Babiana* (*B. stricta, B. regia* & *B. rubrocyanea*), *Gladiolus* (especially *G. watsonius* & *G. gracilis*), various *Ornithogalum* species and a host of representatives from other genera.

FRa 1 Breede Alluvium Renosterveld

Breede River from Worcester to Ashton

A species poor, short, open shrubland with dwarf succulent shrubs and grasses in the gaps, dominated by renosterbos, *Athanasia trifurcata*, *Pentzia incana*, *Ruschia caroli* and *Aspalathus spinosa* amongst others. The grasses are represented by *Ehrharta longiflora*, *E. villosa* and *Themeda triandra* whilst *Crassula expansa* is the most commonly encountered succulent shrublet.

FRc 2 Rûens Silcrete Renosterveld

Riviersonderend to Riversdale

An open, dwarf to low cupressoid to small-leaved grassy shrubland with patches of moderately tall shrubland interspersed and dominated by renosterbos with perdekaroo *Relhania garnotii* and vierkantperdekaroo *Oedera squarrosa*. Grasses are well-represented and includes rooigras *Themeda triandra*, bokbaardgras *Merxmuellera stricta*, and koperdraadgras *M. disticha*. Succulents are frequent and is a characteristic of this unit. These include nenta *Crassula subulata, Stapeliopsis breviloba, S. saxatilis,* aasblom *Stapelia divaricata,* volstruistone *Gibbaeum haagei and Haworthia variegata* var*. hemicrypta.*

key issues

fire

Fire is essential in fynbos vegetation and it is widely accepted that it stimulates recruitment and helps maintain high species diversity. Whilst renosterveld is clearly a fire-maintained system, the fire intervals are not as clear-cut. Generally, the interval of 10 - 15 years is suggested but there is no evidence to support this.

The arid units may only naturally burn every three to four decades whereas on the higher rainfall South Coast three to five years may be more appropriate. The species composition and structure of the vegetation is a product of fire frequency and the subsequent utilisation by herbivores. Fire is used as a tool in the management of fynbos, but is also a widely abused tool. In mesic environments, if renosterveld is burned too frequently, it will transform into grassland, and if fire is excluded for too long, it will transform into a thicket. The consensus however is that fire should not be excluded from renosterveld and as a minimum it should be burned every five to 10 years.

faunal interaction

By all accounts renosterveld historically contained a more diverse and higher numbers of large grazers than other fynbos types. This is especially true of the South Coast with its year round rainfall. These grazers kept the renosterveld as a grassland of sorts. In all likelihood renosterveld as we know it was restricted to rocky areas that were safer from fire (longer fire interval) and not subject to as intense grazing.

Post-fire areas are especially susceptible to selective over-grazing and this can severely alter the regeneration of a diverse shrub component. Utilisation by large ungulates plays a pivotal role in determining the structure of renosterveld especially at the susceptible post-fire stage.

Studies have shown that grazers are important dispersers of certain grass seeds. This together with the nutrient cycling via their dung favours the establishment of grasslands. These grasslands or grazing lawns are then kept in a positive state by constant reseeding and fertilising by grazers.

In more arid areas termites, especially harvester termite *Michrodoterme viator*, performs a similar role. They harvest plant material and also distribute the seeds. Their often ancient colonies appear as raised mounds known as heuweltjies. These mounds and the peripheral soil have a high nutrient status and are favoured by the sclerophyllous thicket species as well as succulents. These bushclumps originate through birds perching on termite heaps and their resultant droppings containing tree seeds.

Just as in strandveld, the sclerophyllous thicket species produce fleshy fruits and these are distributed by frugivorous birds. In this way birds maintain patches of thicket that contribute towards the overall diversity of the flora as well as habitat value.

soil interfaces and outcrops

Where two soil types meet there is often a “tension zone”. Different soils harbour different vegetation types and the meeting point is known as an ecotone. The vegetation here is often a unique combination of both parent types. These ecotones are biologically important because they are often areas of active speciation. For this reason disturbance in this zone must be avoided and it is preferable to buffer it with at least 30m of vegetation on either side.

Rock outcrops and boulder or cobble fields are often encountered in renosterveld. These areas are often refuges for rare or extra-limital species or where the habitat is sufficiently different so as to allow for speciation of particular plant groups. In silcrete renosterveld, there is a high number of endemic succulents amongst the rocky patches. In granite renosterveld, there is a high frequency of bulbs and succulents around the rocks, many of which are restricted to this habitat. One should consider these as out-of-bounds to livestock until late summer.

fragmentation

Renosterveld occurs on soils that are particularly attractive for the cultivation of olives, grapes and wheat. In many cases it survives as patches or fragments surrounded by cultivated lands. Many of these contain viable populations of threatened species. These remaining populations are further threatened by agricultural chemicals and mechanical damage by machinery. These remnants are important in terms of biodiversity conservation and provide habitat not only for threatened plants but also animals that contribute towards pest control.

management objectives

"Sensitive, vulnerable, highly dynamic or stressed ecosystems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure" (National Environmental Management Act, 1998).

site environmental management plan

objective: *To have a site specific Environmental/Conservation Management Plan in place, to guide management actions required on a site scale.*

management actions:

- Commission a site specific EMP to be compiled;
- Use monitoring, observations and site specific requirements to inform further management actions required;
- Make recommendations for revision and highlight areas of under performance;
- Review site EMP as/when required, as defined in the EMP.

funding

objective: *To have an environmental management budget in place that allows for the implementation of this EMP and a site-specific EMP, through the development of a site Annual Plan of Operation (**APO**).*

management actions:

The landowner/manager is to prepare an APO. The APO will consist of the required operating and capital expenditure as well as planned funding sources through external agencies and programmes. The APO will consist of:

- A sustainable budget that is costed annually to allow for the implementation of the EMP.
- Complete an APO, using the template provided in the EMP Guide Tool, by year end of each year.

Opportunities for external funding and assistance do exist; see EMP Guide Tool for funding opportunities.

vegetation management

alien vegetation

objective: *To remove all invasive alien vegetation from the natural areas by the most cost-effective methods with the least amount of damage to the natural environment. Invasive alien vegetation transforms and replaces indigenous vegetation, adds to the fuel load, increasing the fire frequency and intensity, transforms the riparian zones, affects the functioning of aquatic ecosystems by altering water quality and flow and unnaturally supports an increase in rooikat Felis caracal.*

The **Best Practice Guideline: Alien Vegetation Management** provides the information required for control of the invasive alien flora.

Before any clearing of alien vegetation is initiated, it must be understood that when the programme starts, it must be implemented until completion. There is no value in *ad hoc* clearing, with no follow-up program.

management actions:

- Obtain an aerial photograph of the area whenever an official survey is undertaken, to assess plant growth and extent of alien infestation.
- Identify areas for clearing to ensure compliance with the Conservation of Agricultural Resources Act (CARA) regulations.
- Demarcate areas that will not be cleared of alien plant species initially (ensuring that the CARA regulations are complied with at all times).
- Removal of all invasive alien plant species from the natural areas, excluding those identified above.
- Regular assessment of invasive species control and intensity of invasion.

It may be necessary to contract certain tasks such as extensive alien vegetation clearing to private contractors if there is insufficient capacity within the staff establishment or if it is economically beneficial. All private contractors on site must however be strictly controlled.

natural vegetation

objective: *To ensure that the remaining areas of natural vegetation are best managed so as to contribute towards biodiversity conservation, retaining representative samples of our natural vegetation so as to allow for biodiversity and ecological processes to persist.*

management actions:

- Identify the vegetation type/s present on your property;
- Familiarise yourself with best conservation management practices for the particular vegetation type e.g. prescribed ecological burns as per appropriate fire regime;

See the **Best Practice Guideline: Fire Management & Prevention** for more detail.

- Develop a plant species checklist;
- Contribute records of rare and threatened species and localities to SANBI;
- Map the location of rare and threatened plant species to inform management activities e.g. road/path placement;
- Make provision for seasonal monitoring, during spring and autumn months, of rare and threatened flora on site (where possible comment should be made on numbers of individuals and locality);

- A reintroduction plan must be prepared if areas are to be rehabilitated, stating species to be reintroduced and the source of material.

fauna management

objective: *To promote the conservation of indigenous fauna (the big and hairy and small and slimy alike), as an important component contributing to and maintaining ecosystem functioning.*

management actions:

- Develop faunal species lists including mammals, birds, reptiles, amphibians, arachnids and scorpions, and other invertebrates;
- Conduct at least *ad hoc* monitoring of faunal populations and maintain recordkeeping;
- Contribute significant records and localities of fauna to the Atlas databases at the Animal Demography Unit (**ADU**) at University of Cape Town (**UCT**);
- Ensure that management and recreational activities do not impact on sensitive species;
- Implement responsible problem animal management, where necessary, ensuring to be in possession of the relevant permits;
- Eradicate invasive exotic faunal species, where necessary, ensuring to be in possession of the relevant permits;
- Limit the impact (competition and predation) by domestic animals on indigenous species. Where residential estates abut natural areas, it may be necessary to compile a policy on pets. It is preferable to be proactive in this regard.
- Compile a policy on introduction (accidental or deliberate) of potentially invasive species (e.g. wildfowl) or wild animals previously kept as pets e.g. tortoises which could genetically pollute local races or harbour geographically isolated diseases.
- Commission a reintroduction policy and plan for species that used to occur in the area and the suitable carrying capacities. Investigate the potential for reintroductions, specifically small game, which may have previously occurred naturally in the area. Herbivores are essential for biodiversity and ecosystem processes to persist.

Before **reintroduction** the following points need to be considered:

- Was the desired species naturally resident in the area?
- Why did the animal become extinct in the area?
- Is that causal factor still a threat?
- Is the habitat still suitable for the species?
- What are the potential negative effects of the reintroduction?
- Where is the nearest existing population?

The careful reintroduction of species can enhance the conservation value of the area and increase the marketability of the site. All reintroductions must be based on sound ecological principles. CapeNature must be consulted on the translocation and reintroduction of all fauna.

access management

objective: *To inform the best placement and management of access points and pathways, avoiding sensitive process areas such as slopes and prevent excessive path braiding and consequent erosion.*

management actions:

- Conduct an audit of the siting and condition of existing access points and pathways;
- Identify suitable access points and pathways, and decommission those in sensitive process areas;
- Maintain pathways/boardwalks to ensure its use and not the making of alternative routes;
- Implement a rehabilitation programme, where this is required.

use of living resources

objective: *To ensure sustainable use of natural resources, minimising adverse effects on biodiversity and ecosystem processes.*

See the **Best Practice Guideline: Sustainable Utilisation of Natural Resources** for more detail.

recreation & tourism management

objective: *To ensure the appropriate use of natural areas for recreation and tourism, minimising detrimental impact on biodiversity and sensitive processes.*

See the **Best Practice Guideline: Recreation & Tourism Use** for more detail.

road maintenance & erosion control

objective: *To ensure that geomorphological processes and soils are adequately understood and impacts thereon duly minimised, avoiding the consequent loss of natural resources and habitat.*

management actions:

- Identify and understand erosion sources;
- Prioritise erosion problems requiring control efforts;
- Where dune systems have sustained damage due to excessive trampling and/or past access by vehicles, implement a rehabilitation programme. Have measures in place to prevent further erosion damage;
- Road and footpath erosion control must be monitored and managed on an ongoing basis;
- Records should be kept (preferably photographs) of previous erosion management, in order to measure effectivity;

See the **Best Practice Guideline: Sensitive Development** for more detail.

signage & awareness

objective: *To inform of the sensitivity and value of biodiversity features and ecosystem processes, and to facilitate the appropriate use thereof.*

management actions:

- In order to achieve the above, three types of signage need to be considered: **directional**, **informational** and **interpretational**. The first guides visitors to and around the area, while the second provides information on some aspects of the area and management (such as erosion control). Interpretation of the environment, the third form of signage, would focus on aspects such as

functioning of the ecosystem in the natural areas, emphasising the unique biodiversity and ecological processes.

- Where necessary, a signage policy and manual should be compiled;
- Signs indicating the name of the site should be erected at all vehicular and pedestrian access points;
- Signage must be set up to inform of areas being rehabilitated;
- Awareness programmes must be initiated for the purpose of informing and educating residents and visitors regarding environmental sensitivity and interaction (e.g. snake encounters, the value of biodiversity, biological monitoring and rehabilitation)

fencing

objective: *Where necessary, fence areas for access control and management.*

While a definite demarcation of the boundary of natural areas helps visually establish such areas as being of conservation value, rather than simply vacant open space, fencing also limits the natural transit of wildlife and therefore ecosystem processes. It is apparent that continuity of best practice conservation management is required across cadastral boundaries in order for the broader ecosystem to best benefit from holistic management.

management actions:

- Where possible, internal and common cadastral fencing should be removed to allow for connectivity;
- Appropriate fencing should be used, and where possible jackal-proof and electric fencing should be avoided;
- Public road-side boundaries should be well demarcated for access control and to prevent wildlife road kill;
- All roads not for public vehicular access must have locked gates;
- Stiles may be placed over fences to allow access along approved pedestrian paths;
- Where fencing hinders the natural transit of wildlife, provision must be made for thoroughfare e.g. bottom fence strand raised for tortoises;
- Fence line and access gates should be regularly inspected.

archaeological and heritage features

objective: *To ensure that the archaeological and heritage aspects of the site are protected as defined in the Natural Heritage Resources Act 25 of 1999.*

management actions:

- Inform SAHRA of potential heritage features on site and acquire advice on protection measures. These features may be of significant archaeological importance and damage to these features would lower their archaeological value and possibly their tourism value;
- Keep record of heritage features on site;
- Prevent any damage to these features.

monitoring and recordkeeping

objective: *To evaluate management actions of the site as well as monitor biodiversity components and ecological processes. Data can contribute towards regional conservation plans and initiatives and further highlight conservation priorities.*

management actions:

- It is critical that sites collect baseline information (rainfall and resource inventory) as a priority;
- Establish a plan of action/objective for monitoring of specific features, components and processes;
- Describe methods used and maintain these;
- Map fixed monitoring sites or features to be monitored, preferably with a GPS;
- Keep data safe and have duplicates;
- All research activities (external studies) are to be controlled i.e. written permission granted with the condition that a copy of the final research report is provided;
- Manager to compile monthly report, incorporating all incidents, significant events and findings and operations that have taken place.

staff training and skills development

objective: *To continually capacitate and train staff in environmental knowledge and a range of skills and enhance their capacity.*

management actions:

- Staff training should include the following:
  - Regular fire training and fire exercises
  - Use of appropriate machinery, tools and technology
  - Public relations and interactions
  - Ecosystem components
  - Management training
  - Waste management & recycling
  - Use of herbicide application
  - Methods for alien vegetation control

ecological connectivity

objective: *Identify suitable corridors or expansions for connecting natural and protected areas to improve the overall resilience of the protected area and allow processes to function at an appropriate scale and so allow for holistic management of the ecosystem.*

management actions:

- Liaise with CapeNature Regional Office regarding expansion and connectivity opportunities;
- Approach and liaise with neighbours in this regard;
- Draw up a Memorandum of Understanding or contractual agreement between neighbours detailing areas of responsibility amongst others.

voluntary conservation

objective: *Consider proclaiming natural areas for conservation in perpetuity, via the CapeNature Stewardship program.*

management actions:

- Familiarise with the three levels of **stewardship options** i.e. Voluntary Conservation Site, Biodiversity Agreement and Contract Nature Reserve;
- Landowner should contact local CapeNature stewardship coordinator to discuss options and benefits.