**Draft**

***Nanozostera capensis* - Setch.**

PLANTAE - TRACHEOPHYTA - LILIOPSIDA - ALISMATALES - ZOSTERACEAE - Zostera - capensis

**Common Names:** Species code: Zp (English)  
**Synonyms:** Zostera capensis

**Taxonomic Note:**   
*Zostera capensis* has been reclassified as *Nanozostera* (Tomlinson and Posluzny, 2001). Genetic information confirms morphological characterization of *Nanozostera* supported through assessments by Coyer et al. 2013.

|  |
| --- |
| **Red List Status** |
| EN - Endangered, A2(a,c)B2b(ii,iii,iv,v)c(ii,iv) (IUCN Version 3.1) |

# Red List Assessment

## Red List Status

**Is the reassessment subject to the 5-year rule?** (Not specified)

## Assessment Information

**Date of Assessment:**  January 2022

**Reviewed?** (Not specified)

**Assessor(s):** Watson, K.M.

**Reviewer(s):** (Not specified)

**Contributor(s):** Adams, J.B., Banderia, S.O., Jackson, M., Torres, C.H.

**Facilitators/Compilers:** (Not specified)

**Institution(s):** Stellenbosch University

**Regions:** Global

**Regional Expert Questions:** (Not specified)

## Assessment Rationale

*Nanozostera capensis* is present across the southern African coast, classified as a temperate species that extends into a tropical zone. This species occurs in the intertidal zone of permanently open estuaries but can be found in temporarily open/closed estuaries when conditions are saline (Adams 2016). Although it is fast growing, it does not colonise quickly. The population is severely fragmented and experiencing extreme fluctuations in population size throughout its range due to dynamic changes in cover abundance (Adams 2016, Bandeira *et al.* 2014, Pillay *et al.* 2010). This is in response to continuing decline in habitat quality, with major threats including coastal development, flooding, sedimentation and pollution as well as destructive shellfish harvesting and bait collecting (Adams 2016, Bandeira and Gell 2003, Human *et al.* 2016, Pillay *et al.* 2010, Talbot *et al.* 1990). In South Africa, widespread and cumulative threats have resulted in localised extinctions of *Z. capensis* (Adams 2016). Overall, these impacts have a cascading effect influencing higher trophic levels, with losses impacting heavily on endangered species such as *Hippocampus capensis* and *Siphonaria compressa* (Pillay *et al.* 2010, Mead *et al.* 2013).

## Reasons for Change

**Reason(s) for Change in Red List Category from the Previous Assessment:** Although widespread across its core range,*Nanozostera capensis* has a small area of occupancy (AOO) and is locally extinct from two estuaries (Durban Bay and St Lucia) due to anthropogenic impacts. Further pressures from coastal development, boating, bait digging and pollution are driving declines in habitat quality, resulting in direct and immediate losses. Population fluctuation is extreme, due to environmental changes coupled with anthropogenic impacts.

## Red List Index

**Red List Index:** (Not specified)

# Distribution

## Geographic Range

*Nanozostera capensis* occurs within the Temperature Southern Ocean bioregion. The central distribution ranges from the warm-temperate south coast and the subtropical east coast of South Africa, extending up to the tropical east coast of Mozambique (Adams 2016). It has also been reported in southern Kenya and the northwest coast of Madagascar (Green and Short 2003). *Nanozostera capensis* has a limited patchy distribution due to a lack of suitable habitat, occupying approximately 11-13 km2 (Adams *et al.* 2018).

This is the only species of this seagrass genus present in the tropical and temperate regions of Africa. It is rare in the tropics (northern Mozambique, Tanzania, Kenya, and western Madagascar) but abundant in the southern part of its range (southern tip of Mozambique and South Africa).

## Area of Occupancy (AOO)

|  |  |
| --- | --- |
| **Estimated area of occupancy (AOO) - in km2** | **Justification** |
| 11-13 | Adams *et al.* 2018 |

|  |  |  |
| --- | --- | --- |
| **Continuing decline in area of occupancy (AOO)** | **Qualifier** | **Justification** |
| Localised exctintions in Knysna Lagoon, Langebaan Lagoon, Durban Bay, St. Lucia Bay and Mhlathuze Estuary. | Confirmed | Adams *et al.* 2013  Human *et al.* 2016  Pilley *et al.* 2010  Weerts pers. comm. 2016 |

**Extreme fluctuations in area of occupancy (AOO):** Yes

## Extent of Occurrence (EOO)

**Estimated extent of occurrence (EOO)- in km2:** (Not specified)

**Continuing decline in extent of occurrence (EOO):** (Not specified)

**Extreme fluctuations in extent of occurrence (EOO):** (Not specified)

## Locations Information

**Number of Locations:** 62 in South Africa (Adams 2016).

|  |  |  |
| --- | --- | --- |
| **Continuing decline in number of locations** | **Qualifier** | **Justification** |
| - | Suspected | - |

**Extreme fluctuations in the number of locations:** (Not specified)

## Very restricted AOO or number of locations (triggers VU D2)

**Very restricted in area of occupancy (AOO) and/or # of locations:** (Not specified)

## Elevation / Depth / Depth Zones

**Elevation Lower Limit (in metres above sea level):** (Not specified)

**Elevation Upper Limit (in metres above sea level):** 0.9 (Adams 2016)

**Depth Lower Limit (in metres below sea level):** 6

**Depth Upper Limit (in metres below sea level:** (Not specified)

**Depth Zone:** Shallow photic (0-50m)

## Map Status

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Map Status** | **Use map from previous assessment** | **How the map was created, including data sources/methods used:** | **Please state reason for map not available:** | **Data Sensitive?** | **Justification** | **Geographic range this applies to:** | **Date restriction imposed:** |
| Done | - | - | - | - | - | - | - |

## Biogeographic Realms

**Biogeographic Realm:** (Not specified)

# Occurrence

## Countries of Occurrence

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Country** | **Presence** | **Origin** | **Formerly Bred** | **Seasonality** |
| Kenya | Extant | Native | - | Resident |
| Madagascar | Extant | Native | - | Resident |
| Mozambique | Extant | Native | - | Resident |
| South Africa | Extant | Native | - | Resident |
| Tanzania, United Republic of | Extant | Native | - | Resident |

## Large Marine Ecosystems (LME) Occurrence

**Large Marine Ecosystems:** (Not specified)

## FAO Area Occurrence

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Presence** | **Origin** | **Formerly Bred** | **Seasonality** |
| 47. Atlantic - southeast | Extant | Native | - | Resident |
| 51. Indian Ocean - western | Extant | Native | - | Resident |

# Population

*Nanozostera capensis* is the dominant species in the southern part of its range. It is predominantly a temperate species that has a rare, patchy distribution into the tropics (Adams 2016, Green and Short 2003). The distribution of *Z. capensisis* ishighly dynamic, with localised declines or extinctions having been documented throughout its range (Adams 2016).

In South Africa, *Z. capensis* is the dominant seagrass species with a wide distribution across 62 estuaries, from the Olifants Estuary on the west coast to Kosi Bay on the east coast (Adams 2016). This species experiences extreme fluctuations in population size with dynamic changes in cover abundance brought about by floods, droughts, sedimentation and freshwater abstraction (Talbot *et al.* 1987, Talbot *et al.* 1990, Adams and Talbot 1992, Cyrus *et al.* 2008, Pillay *et al.* 2010, Adams 2016). Due to localised threats and a fluctuating population, this species is listed as regionally Endangered (Adams *et al.* 2018). Across South Africa, this species occurs in some estuaries as small patches and continuous meadows in others. The largest and more permanent *Z. capensis* beds are Berg (206 ha) and Knysna (316 ha) estuaries (Boucher and Jones 2007, Wasserman *et al.* 2020).

Localised extinctions have been reported throughout South Africa (Adams 2016). It is locally extinct in Durban Bay as a result of habitat loss from harbour construction, reclamation and dredging; and St Lucia due to natural disasters as a result of prolonged drought and closed mouth conditions (Adams 2016, Adams and van der Colff 2016). Localised extinction of *Z. capensis* has also been documented at Mhlathuze Estuary due to unstable sediment and high turbidity (Weerts pers. comm. 2016). This species has also been lost from other small KwaZulu-Natal estuaries, including Umgababa Estuary and Mahlongwana Estuary (Adams *et al.* 2018, Day 1950, Hiralal 2001). This is due to coastal development, freshwater abstraction and catchment disturbance which has led to mouth closure and loss of intertidal habitat (Adams 2016). Eutrophication of rivers in estuarine catchments has led to increased algal growth, shading and competition downstream, causing local extinction of *Z. capensis* in parts of the Knysna Lagoon (Human et al. 2016). In Langebaan Lagoon, sediment turnover and trampling due to bait digging caused localised extinction of *Z. capensis* (Pillay *et al.* 2010). However, previously unrecorded large meadows have been discovered in the Kobonqaba Estuary. The extent of this *Z. capensis* bed remains unknown (Hoppe-Speer *et al.* 2013, Adams 2016).

The largest area of coverage of *Z. capensis* globally is found in Maputo Bay, Mozambique, occupying approximately 4,016 ha (Bandeira and Gell 2003). In Maputo Bay, the *Z. capensis* population is highly dynamic, but has reduced by more than a third (Bandeira and Gell 2003). Declines in cover for all seagrass species have also been documented for Bairro dos Pescadores and Inhaca Island. *Zostera capensis* is the dominant species in Bairro dos Pescadores, but declined from 1,732 ha in 1991, to 73 ha in 2003 (95.8 % loss). Inhaca has also seen declines from 871 ha in 1991 to 808 ha in 2003 (7.2 % loss; Bandeira and Gell 2003). Declines in cover were due to sedimentation from flooding, as well as habitat destruction from collection of clams (Bandeira and Gell 2003, Banderia 2014).

The total area of *Z. capensis* in Tanzania is unknown, with the last confirmed sighting in Zanzibar in 2006 (Ochieng and Erftemeijer 2003). The total area in Kenya is also unknown, it was last recorded in Shimoni near the border of Tanzania in 2003 (Ochieng and Erftemeijer 2003). The historical distribution was cited as being more abundant on the north Kenya coast in a few isolated localities than further south, despite equally favourable habitats (Isaac 1968). The full extent and area is also unknown for *Z. capensis* across northwest Madagascar (den Hartog 1970, den Hartog pers. comm. 2006).

## Population Information

**Current Population Trend:** Declining

**Number of mature individuals (=population size):** (Not specified)

**Extreme fluctuations? (in # of mature individuals):** Yes

|  |  |
| --- | --- |
| **Severely fragmented?** | **Justification** |
| Yes | Isolated populations (Adams 2016, Adams *et al.* 2018) |

|  |  |  |
| --- | --- | --- |
| **Continuing decline in mature individuals?** | **Qualifier** | **Justification** |
| - | Suspected | - |

|  |  |  |
| --- | --- | --- |
| **Continuing decline % in mature individuals within 1 generation or 3 years, whichever is longer (up to max. of 100 years in the future)** | **Qualifier** | **Justification** |
| - | Suspected | - |

|  |  |  |
| --- | --- | --- |
| **Continuing decline % in mature individuals within 2 generations or 5 years, whichever is longer (up to max. of 100 years in the future)** | **Qualifier** | **Justification** |
| - | Suspected | - |

|  |  |  |
| --- | --- | --- |
| **Continuing decline % in mature individuals within 3 generations or 10 years, whichever is longer (up to max. of 100 years in the future)** | **Qualifier** | **Justification** |
| - | Suspected | - |

**Extreme fluctuations in the number of subpopulations:** Yes

|  |  |  |
| --- | --- | --- |
| **Continuing decline in number of subpopulations** | **Qualifier** | **Justification** |
| - | Suspected | - |

**All individuals in one subpopulation:** No

**Number of mature individuals in largest subpopulation:** (Not specified)

**Number of Subpopulations:** Two (Phair *et al.* 2019)

## Population Reduction - Past

|  |  |  |  |
| --- | --- | --- | --- |
| **Percent Change in past** | **Reduction or Increase** | **Qualifier** | **Justification** |
| (Not specified) % | - | Projected | - |

**Past Population Reduction Basis:** (Not specified)

**Causes of past reduction reversible?** Not for St.Lucia Bay, Mhlathuze Estuary and Durban Bay due to unstable sediment and high turbidity (Weerts pers. comm. 2016).

**Causes of past reduction understood?** Yes

**Causes of past reduction ceased?** No

## Population Reduction - Future

|  |  |  |  |
| --- | --- | --- | --- |
| **Percent Change in future** | **Reduction or Increase** | **Qualifier** | **Justification** |
| (Not specified) % | Reduction | Predicted | Phair, 2016 |

**Future Population Reduction Basis:** Phair (2016) predicted that under future climate scenarios, the suitable habitat for *Z. capensis* will decrease across South African estuaries.

## Population Reduction - Ongoing

**Both: Percent Change over any 10 year or 3 generation period, whichever is longer, and must include both past and future, future can't go beyond 100 years:** (Not specified)

**Both Population Reduction Basis:** (Not specified)

**Causes of both (past and future) reduction reversible?** (Not specified)

**Causes of both (past and future) reduction understood?** No

**Causes of both (past and future) reduction ceased?** No

## Quantitative Analysis

**Probability of extinction in the wild within 3 generations or 10 years, whichever is longer, maximum 100 years:** (Not specified)

**Probability of extinction in the wild within 5 generations or 20 years, whichever is longer, maximum 100 years:** (Not specified)

**Probability of extinction in the wild within 100 years:** (Not specified)

# Habitats and Ecology

*Nanozostera capensis* occurs in shallow bays, estuaries and lagoons, typically on muddy flats or in fine sediment. This species has a patchy and fragmented distribution with extreme fluctuations in meadow cover in some estuaries. Predominantly it is found in permanently open systems, but it also occurs in estuaries that close periodically to the sea (e.g., Klein Brak, South Africa). This is a low intertidal species, occurring below sea level (i.e., subtidal) down to 6 m depths in the shallow photic zone, to elevations of 0.9 m AMSL (above mean sea level; Adams, 2016; Bandeira, 2014). *Zostera capensis* has a salinity tolerance range of between 10 and 45 ppt (Adams and Bate, 1994).

Whilst it is fast growing, typical of the *Zostera* genus*,* this plant does not colonise quickly (Banderia 2014). Yet this species can quickly re-establish following disturbances such as flooding, due to a persistent rhizome structure and vegetative re-growth. *Nanozostera capensis* cangrow in strong tidal currents as well as tolerate periods of exposure and desiccation due to its protected meristerms, strong root systems and flexible leaves (Adams 2016). This species has also been shown through field observations to have great morphological plasticity, with longer broader leaves in calm deeper/subtidal waters versus shorter narrower leaves at more exposed/intertidal sites. This could be in response to exposure and desiccation as well as mechanical damage from wave action (Adams and Bate 1994, Talbot and Bate 1987).

Flowering of *Z. capensis* has only been observed flowering a few times in the field and once in controlled aquarium conditions (Adams, van Wyk, von der Heyden, Watson pers. comm.). Inflorenscences have been found in South Africa at Berg, Breede and Olifants to the west, and uMhlathuze, Mngazana and Swartkops to the south during the summer months. Experimental cultures have been found to flower seven months after transplanting under a 16-18°C temperature regime (McMillan 1980).

In terms of zonation, this species only overlaps with *Spartina maritima* (M.A. Curtis) Fernald (Adams *et al.* 1999). *Zostera capensis* can be found alongside other submerged macrophytes such as *Ruppia cirrhosa* (Petagna) Grande or *Stuckenia pectinatus* (L.) Böerner, which typically outcompete this species (Adams and Bate, 1994). On the east coast, *Z. capensis* mostly occurs in the lower intertidal zone of estuaries with mangroves, such as *Avicennia marina* (Forssk.)(Adams 2016). Generally *Z. capensis* is found in large monospecific stands in southern Mozambique and South Africa (Bandeira and Gell 2003) although does occur in mixed seagrass stands in intertidal areas with *Halophila ovalis* (R.Brown) in Kysnsa, South Africa. In southern Mozambique, *Z. capensis* can be found in mixed-seagrass communities on sandy substrates with *Thaiassia hempnchii* (Ehrenb. ex Solms), *Halodule wrightii* (Asch), *Thalassodendron ciliatum* (Forssk.) and *Cymodocea serrulata* (R.Brown)(Green and Short 2003). In northern Mozambique, *Z. capensis* and *H. wrightii* also form mixed beds (Green and Short 2003).

*Zostera capensis* beds play a vital role in coastal ecology, supporting a diverse and abundant community of invertebrates and fish. *Zostera capensis* meadows also provide crucial habitat for endemic species such as the endangered Knysna seahorse *H. capensis* and Bot klipfish *Clinus spatulatus* (Lockyear *et al.* 2006, Von der Heyden *et al.* 2015). This species also supports productivity by providing refugia and nursery habitat for invertebrates and juvenile fish (Hemminga and Duarte 2000). The *Z. capensis* beds provide both a direct, or through epiphytes, indirect food source (Källèn *et al.* 2012). Through supporting a high density of invertebrates (i.e. primary consumers), in turn, this provides various predators (i.e. secondary consumers) such as crabs, fish and waterfowl with a rich foodsource (Adams 2016). Overall, the habitat stability provided by *Z. capensis* beds increases trophic complexity (Siebert and Branch 2007).

## IUCN Habitats Classification Scheme

|  |  |  |  |
| --- | --- | --- | --- |
| **Habitat** | **Season** | **Suitability** | **Major Importance?** |
| 9.5. Marine Neritic -> Marine Neritic - Subtidal Sandy-Mud | - | Suitable | - |
| 9.6. Marine Neritic -> Marine Neritic - Subtidal Muddy | - | Suitable | - |
| 9.9. Marine Neritic -> Marine Neritic - Seagrass (Submerged) | - | Suitable | - |
| 9.10. Marine Neritic -> Marine Neritic - Estuaries | - | Suitable | - |
| 12.4. Marine Intertidal -> Marine Intertidal - Mud Flats and Salt Flats | - | Suitable | - |
| 12.5. Marine Intertidal -> Marine Intertidal - Salt Marshes (Emergent Grasses) | - | Suitable | - |
| 12.6. Marine Intertidal -> Marine Intertidal - Tidepools | - | Suitable | - |
| 12.7. Marine Intertidal -> Marine Intertidal - Mangrove Submerged Roots | - | Suitable | - |

## Continuing Decline in Habitat

|  |  |  |
| --- | --- | --- |
| **Continuing decline in area, extent and/or quality of habitat?** | **Qualifier** | **Justification** |
| - | Suspected | - |

## Life History

|  |  |  |
| --- | --- | --- |
| **Generation Length** | **Justification** | **Data Quality** |
| 4 | - | - |

**Age at Maturity: female or unspecified:** (Not specified)

**Age at Maturity: Male:** (Not specified)

**Size at Maturity (in cms): Female:** (Not specified)

**Size at Maturity (in cms): Male:** (Not specified)

**Longevity:** (Not specified)

**Average Reproductive Age:** (Not specified)

**Maximum Size (in cms):** (Not specified)

**Size at Birth (in cms):** (Not specified)

**Gestation Time:** (Not specified)

**Reproductive Periodicity:** (Not specified)

**Average Annual Fecundity or Litter Size:** (Not specified)

**Annual Rate of Population Increase:** (Not specified)

**Natural Mortality:** (Not specified)

## Breeding Strategy

|  |
| --- |
| **Does the species lay eggs?** |
| No |

|  |
| --- |
| **Does the species give birth to live young** |
| No |

|  |
| --- |
| **Does the species exhibit parthenogenesis** |
| No |

|  |
| --- |
| **Does the species have a free-living larval stage?** |
| No |

|  |
| --- |
| **Does the species require water for breeding?** |
| No |

## Movement Patterns

**Movement Patterns:** (Not specified)

**Congregatory:** (Not specified)

## Systems

**System:** Marine

## Plant Specific

**Wild relative of a crop?** (Not specified)

|  |
| --- |
| **Plant Growth Forms** |
| Graminoid |

# Use and Trade

## General Use and Trade Information

**Species not utilized:** True

**No use/trade information for this species:** (Not specified)

**General notes regarding trade and use of this species:** (Not specified)

**Local Livelihood:** (Not specified)

**National Commercial Value:** (Not specified)

**International Commercial Value:** (Not specified)

**End Use:** (Not specified)

**Is there harvest from captive/cultivated sources of this species?** (Not specified)

**Trend in level of total offtake from wild sources:** (Not specified)

**Trend in level of total offtake from domesticated sources:** (Not specified)

**Harvest Trend Comments:** (Not specified)

## Non- Consumptive Use

**Non-consumptive use of the species?** (Not specified)

**Explanation of non-consumptive use:** (Not specified)

## Livelihoods

**Livelihoods:** (Not specified)

# Threats

Due to the isolated populations of *Nanozostera capensis* in coastal estuaries and lagoons this species is particularly susceptible to coastal development (i.e., harbour construction, reclamation, and dredging) and habitat disturbance. In South Africa, widespread and cumulative threats have resulted in the loss of *Z. capensis* area cover or localised extinctions (Adams 2016). This has a cascading effect influencing higher trophic levels, with losses impacting heavily on endangered species such as *H. capensis* and *S. compressa* (Mead *et al.* 2013, Pillay *et al.* 2010).

Immediate and direct losses of *Z. capensis* are also caused by boating, due to physical removal by propellers, bank erosion or by increasing turbidity (Adams 2016). Sediment turnover and trampling due to bait digging or pumping for sand and mudprawns is extensive in some estuaries (e.g., Langebaan Lagoon; Pillay *et al.* 2010). However, in other estuaries such as Knysna, Swartkops and Bushmans, *Z. capensis* has persisted despite extensive and continuous bait digging (Adams 2016).

Flooding of estuarine areas, sedimentation and pollution are major threats to this species. In South Africa (and potentially elsewhere along its range), *Z. capensis* is exposed to a range of nutrient levels, with eutrophication being a potentially important stressor (Mvungi and Pillay 2019, van Wyk *et al.* 2022), as it can lead to increased algal growth, shading and competition (Human *et al.* 2016).

In Mozambique, shellfish harvesting for bivalves (hand-digging) and bait-collecting are significant threats to *Z. capensis* (Bandeira *et al.* 2014). Trampling, sand excavation and scouring in Maputo Bay as a result of bivalve collection and fishing gear has greatly reduced the extent of the largest *Z. capensis* beds in this region (Bandeira *et al.* 2014). The area reduction at a once thriving small meadow of *Z. capensis* in Inhaca resulted from a cumulation of both natural disturbances (i.e., sand accretion and sedimentation) as well as anthropogenic causes (i.e. trampling, motorboats and a jetty construction; Bandeira 2002). Sedimentation of *Z. capensis* meadows in southern Mozambique due to the floods in 2000, resulted in massive seagrass dieback (86% reduction) between 1991 and 2003 (Bandeira *et al.* 2014).

## Threats Classification Scheme

**No past, ongoing, or future threats exist to this species:** No

**The threats to this species are unknown:** No

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Threat** | **Timing** | **Scope** | **Severity** | **Impact Score** |
| 1.2. Residential & commercial development -> Commercial & industrial areas | Ongoing | - | - | Low Impact: 3 |
| 2.4.3. Agriculture & aquaculture -> Marine & freshwater aquaculture -> Scale Unknown/Unrecorded | Ongoing | - | - | Low Impact: 3 |
| 9.1.3. Pollution -> Domestic & urban waste water -> Type Unknown/Unrecorded | Ongoing | - | - | Low Impact: 3 |
| 9.2.3. Pollution -> Industrial & military effluents -> Type Unknown/Unrecorded | Ongoing | - | - | Low Impact: 3 |
| 9.3.2. Pollution -> Agricultural & forestry effluents -> Soil erosion, sedimentation | Ongoing | - | - | Low Impact: 3 |
| 9.3.4. Pollution -> Agricultural & forestry effluents -> Type Unknown/Unrecorded | Ongoing | - | - | Low Impact: 3 |
| 11.4. Climate change & severe weather -> Storms & flooding | Ongoing | - | - | Low Impact: 3 |

# Conservation

Within South Africa, approximately 30% of all estuaries with *Z. capensis* have some formal protection status (Adams 2016). Furthermore, approximately 46% of all estuaries in South Africa containing *Z. capensis* have estuary management plans, which through zonation of activities such as bait collection and angling (Adams 2016). Although the protection and management of *Z. capensis* in South African estuaries may seem adequate, there is minimal policing or enforcement of this afforded protection (Adams 2016).

In South Africa, local projects including Project SeaStore and The Knysna Basin Project aim to support conservation through research, education, and outreach. Project SeaStore in particular is focused on restoration trials, estimating blue carbon stored in seagrass meadows, microplastics in seagrass meadows, as well as micropropagation as a tool for restoration.

*Zostera capensis* is protected in Mozambique within Ponta do Ouro (Partial Marine Reserve), Bazaruto (National Park) and Cabo de São Sebastião (Total Protection Zone). Each of these Marine Protected Areas have a management plan in place. Conservation work in Mozambique is being conducted by The Dugong and Seagrass Conservation Project. Their work includes environmental education and awareness programmes, as well as community-based management through seagrass monitoring and surveillance.

There are a few conservation measures currently in place for *Nanozostera capensis* in Tanzani. It is protected in coastal zone management initiatives by IUCN, Zanzibar (Menai Bay Conservation Project), Mafia Marine Park (by WWF) and Kinondoni Coastal Area Management Programme.

## Conservation Actions In- Place

**Action Recovery Plan:** (Not specified)

**Systematic monitoring scheme:** (Not specified)

**Conservation sites identified:** Yes

|  |  |
| --- | --- |
| **Occur in at least one PA** | **Note** |
| Yes | Migrated from Conservation Measures 4.4 Habitat and Site-based actions -> Protected Areas: in-place |

**Percentage of population protected by PAs (0-100):** Approximately 30% in South Africa (Adams 2016).

**Area based regional management plan:**

South Africa: Olifants, Langebaan, Berg, Bot/Kleinmond, Klein, Uilkraals, Heuningnes, Breede, Goukou, Gourits, Klein Brak, Groot Brak, Wilderness, Swartvlei, Knysna, Keurbooms, Gamtoos, Swartkops, Sundays, Nahoon, Mntafufu, Mtentu, Mpenjati, iSipingo, Durban Bay, Matigulu/Nyoni, Mlalazi, St Lucia, Kosi.

Mozambique: Ponta do Ouro, Bazaruto, Cabo de São Sebastião.

**Invasive species control or prevention:** Successful eridication of *Spartina alterniflora* at the Great Brak Estuary.

**Harvest management plan:** No

**Successfully reintroduced or introduced benignly:** Restoration experiments in Langebaan Lagoon, South Africa (Watson *et al.* 2022) and Maputo Bay, Mozambique (Amone-Mabuto *et al.* 2022, Banderia *et al.* 2020) are ongoing. Transplantation work in Knysna has also been trialed (Mokumo pers. comm. 2021).

**Subject to ex-situ conservation:** No

**Subject to recent education and awareness programmes:** South Africa:Project SeaStore, The Kynsa Basin Project. Mozambique: The Dugong and Seagrass Conservation Project.

**Included in international legislation:** No

**Subject to any international management/trade controls:** No

## Important Conservation Actions Needed

|  |  |
| --- | --- |
| **Conservation Actions** | **Note** |
| 2.1. Land/water management -> Site/area management | - |
| 2.3. Land/water management -> Habitat & natural process restoration | - |
| 3.2. Species management -> Species recovery | - |
| 4.3. Education & awareness -> Awareness & communications | - |
| 5.1.2. Law & policy -> Legislation -> National level | - |
| 5.4.2. Law & policy -> Compliance and enforcement -> National level | - |
| 5.4.3. Law & policy -> Compliance and enforcement -> Sub-national level | - |

## Research Needed

|  |  |
| --- | --- |
| **Research** | **Note** |
| 1.3. Research -> Life history & ecology | - |
| 1.6. Research -> Actions | - |
| 2.3. Conservation Planning -> Harvest & Trade Management Plan | planning-> Harvest & trade management plan |
| 3.1. Monitoring -> Population trends | - |

# Ecosystem Services

## Ecosystem Services Provided by the Species

**Insufficient Information Available:** (Not specified)

**Species provides no ecosystem services:** (Not specified)

**Ecosystem Services:** Carbon sequestration, nutrient cycling, benthic habitat, food provision, sediment stabilisation and trapping microplastics (Adams 2016, Banda *et al.* 2021, Barnes 2013, Boschoff *et al.* 2023, Hanekom and Russell 2015, Human *et al.* 2015, Human *et al.* 2022, Gullström *et al.* 2002, Ndhlovu *et al.* 2022, Pilley *et al.* 2010, Siebert and Branch 2005, Strydom 2015).

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