

## SEaweeds

**S**eaweeds are an important marine resource in Namibia. They are harvested worldwide primarily for the extraction of chemicals that serve as gelling and thickening agents in foods, and for media used in medical and microbiological work. These chemical agents are classified in 3 major categories: agar, carrageenans, and alginate. Agar is the most valuable of these compounds because it is the strongest known gelling agent, is essentially inert, and does not require additional chemicals in order to gel. Carrageenan is a general term for a group of closely related gelling compounds which are also important gelling and thickening agents but usually require the presence of ions of potassium or calcium in order to gel. Alginate is a general thickening, binding, and gelling agent that has a variety of uses in food, textile, and manufacturing industries. Aside from providing valuable gelling agents, seaweeds are also important for direct consumption by man, as an animal feed supplement, as food for abalone farms, and as fertilizer.

There are numerous species of seaweeds and algae in Namibia. At least 9 species are of important present or potential use, and are presented here. They are included in 3 major categories of seaweeds: the red, brown, and green algae. These 3 divisions are usually distinguishable by the colour that their name suggests, except red algae can be either red, brown, yellow, or dark in colour.

Reproduction takes place in various ways, including sexual (gametes), asexual (spores), and vegetative propagation (e.g., fragmentation of thallus). The life cycle may entail 1, 2, or 3 generations that can be morphologically similar or dissimilar and sometimes alternating between macroscopic and microscopic.

### TECHNICAL TERMS

**Agarophyte** - Agar producing seaweed.

**Axis** - Equivalent of stem or branch in terrestrial plants.

**Dichotomous** - Dividing into 2.

**Distal** - Away from point of attachment.

**Frond** - Equivalent to a terrestrial plant leaf.

**Gametophyte** - Sexually reproducing form that bears gametes.

**Holdfast** - An attachment organ.

**Midrib** - Thickened central portion of thallus.

**Papillae** - Soft gland or protuberance.

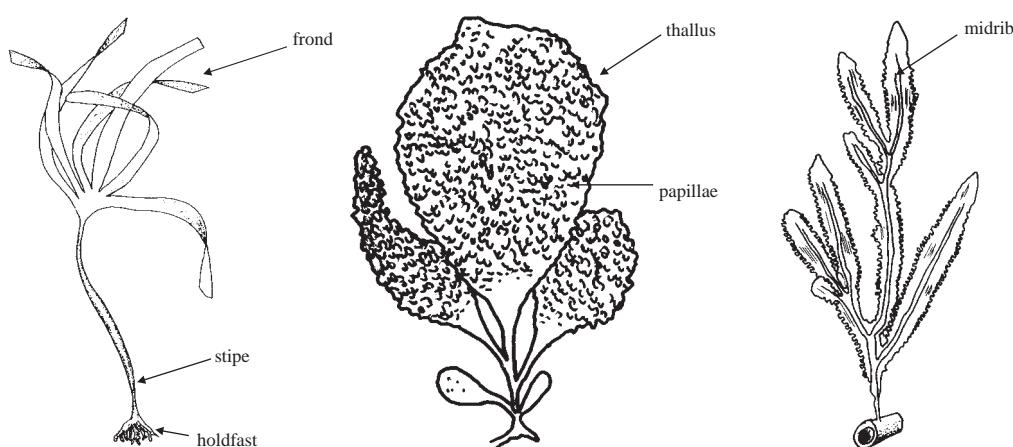
**Proximal** - Towards the point of attachment.

**Sporophyte** - Asexually reproducing form that bears spores.

**Stipe** - Equivalent to a trunk or stem in terrestrial plants.

**Thallus** - Plant body not differentiated into roots, stem, and leaves.

**Tetrasporophyte** - Third generation form of algae, bearing spores.



## Division RHODOPHYTA - Red Algae

*Gracilaria gracilis* (Stackhouse) Steentoft, (1995)

**FAO names:** En - Warty gracilaria; Fr - Gracilaire commune; Sp - Gracilaria común.

**Local names:** Sea grass.

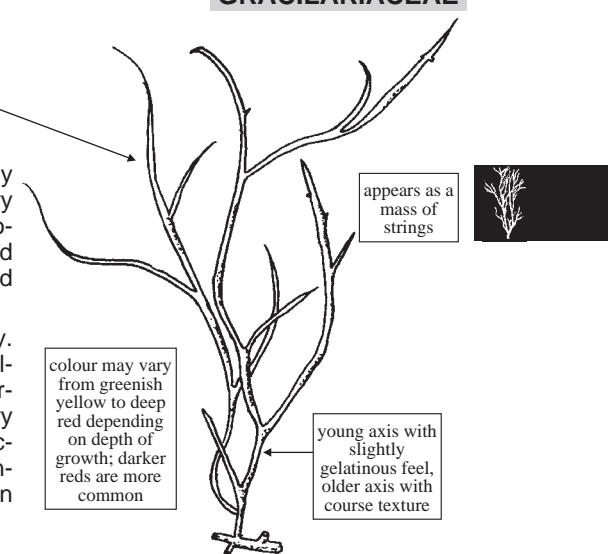
**Size:** Up to 3 m long; axis up to 2 mm thick.

**Utilization:** Important source of agar. Exported raw dried, mostly from the Lüderitz area where production increased from 310 t dry weight in 1982 to over 1 500 t in 1988; in 1990, 1 033 t were produced. Harvested as beach cast; collection from beds prohibited due to ecological damage. Commercial mariculture around Lüderitz.

**Habitat and biology:** In Namibia, occurs mostly in Lüderitz Bay. Grows in sand and mud from depths of 2 to 11 m without specialized attachment organs (Molloy and Bolton, 1996). Aerial portions break free and are cast up on the beach. Life history consists of 3 phases; the gametophytes and sporophyte are macroscopic and identical, the third phase is microscopic. Often confused with closely related *Gracilariaopsis* species which grow in the Walvis Bay and Swakopmund area.

moderately branched

appears as a mass of strings

*Gigartina radula* (Esper) J. Agardh, 1851

**FAO names:** En - Tongue weed; Fr - Langue verrueuse; Sp - Lengua verrucosa.

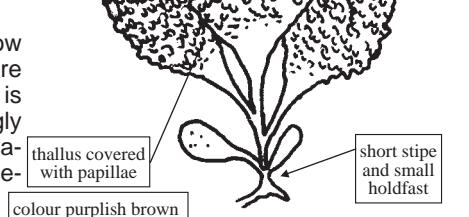
**Local names:**

morphologically variable but generally ovoid

**Size:** Usually not more than 15 cm long.

**Utilization:** Gigartinaceae produce carrageenans and are harvested worldwide. They have never been harvested in Namibia but there is a potential for both *G. radula* and *G. stiriata*. Recommended harvesting is by hand plucking as opposed to cutting, as recovery rate is faster.

**Habitat and biology:** Occurs in the intertidal zone from the low water mark to 0.5 m above this point. They grow on rocks, more prolifically in sheltered areas than exposed shores. Range is from the Orange River to Swakopmund, becoming increasingly more scarce towards the north of the range. Morphological variation is partially accounted for by the life cycle of which each species has 2 macroscopic and 1 microscopic phase.

*Gigartina stiriata* (Turner) J. Agardh, 1851

**FAO names:** En - Fleshy moss; Fr - Mousse charnue; Sp - Musgo carnoso.

**Local names:**

**Size:** Usually not more than 15 cm long.

**Utilization:** See *Gigartina radula*.

**Habitat and biology:** See *Gigartina radula*.

colour purplish brown

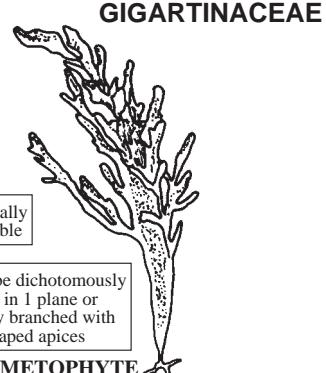
rubbery texture

TETRASPOROPHYTE

morphologically highly variable

thallus may be dichotomously branched in 1 plane or haphazardly branched with boat-shaped apices

GAMETOPHYTE



***Aeodes orbitosa* (Shur) Schmitz, 1894**

large, thin, ovoid to circular thallus

**CRYPTONEMIACEAE**

**FAO names:** En - Yellow skin; Fr - Peau jaune; Sp - Cáscara amarilla.

**Local names:**

**Size:** Can attain a diameter of 1 to 1.5 m.

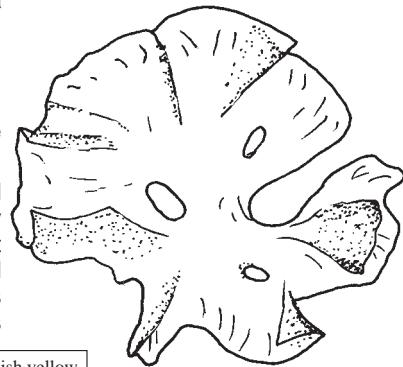
slimy smooth texture

**Utilization:** *Aeodes* contains a carrageenan type colloid but to date has not been exploited anywhere in the world.

**Habitat and biology:** *Aeodes orbitosa* grows prolifically south of and around Lüderitz, but north of Ichaboe Island the species is very scarce, however it has been reported (Simons, 1976) to occur at Cape Frio. Though *A. orbitosa* grows on exposed and sheltered intertidal sites, largest plants grow in sheltered bays where thallus surface areas of up to 1 m<sup>2</sup> can be attained. On exposed shores plants tend to be small.

colour brownish yellow

no stipe and small holdfast

***Suhria vittata* (Linnaeus) J. Agardh, 1842**

membranous with midrib

**GELIDIACEAE**

**FAO names:** En - Red ribbons; Fr - Rubans rouges; Sp - Cintas rojas.

**Local names:** Red ribbons.

resembles red ribbons

**Size:** Lengths of up to 70 cm can be attained.

margins of the thallus fringed with ramuli (small leaflets)

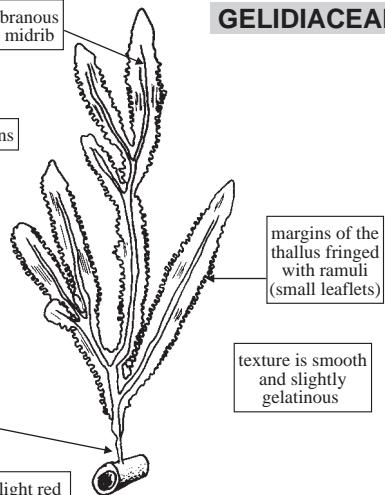
**Utilization:** An agarophyte which has never been exploited though its agar yield is said to be satisfactory (Anderson, 1985). As the seaweed only grows amongst kelp beds it would be difficult to harvest.

**Habitat and biology:** Endemic to Southern Africa. Grows on the stipes of the kelps *Ecklonia maxima* and *Laminaria schinzii*, on the limpet *Patella compressa* (which is found on the stipes of *Ecklonia maxima*), and rarely, on subtidal rock. It occurs from the Orange River to an unknown northward range. Two identical macroscopic and 1 microscopic phase.

texture is smooth and slightly gelatinous

small holdfast attaches the plant from which the bare midrib arises (resembling a stipe)

colour varies from dark to light red

***Porphyra capensis* (Kuetzing, 1843)****BANGIACEAE**

**FAO names:** En - Cape laver; Fr - Nori du Cap; Sp - Nori del Cabo.

**Local names:**

**Size:** Average 4 cm.

**Utilization:** *Porphyra* is not used in Namibia but species of the *Porphyra* genus are used in the Far East for human consumption, the product is called "nori" and is the basis of a multi-billion dollar industry.

**Habitat and biology:** On the Namibian coast *Porphyra capensis* occurs from the Orange River to the Kunene River. It grows highest up on the shore of any seaweed and forms an easily recognizable monospecific band. Reproduction involves 3 morphologically dissimilar phases. The macroscopic phase is gametophytic and the other phases are microscopic.

thin (1-2 cells thick) thallus of varying shape but generally ovoid



colour varies from dark purple-black to yellow; dark colours are more common

slippery texture and becomes crisp and brittle when dry

## Division PHAEOPHYTA - Brown Algae

*Laminaria pallida* var *schinzii* Foslie, 1893

older plants may have a warty textured stipe

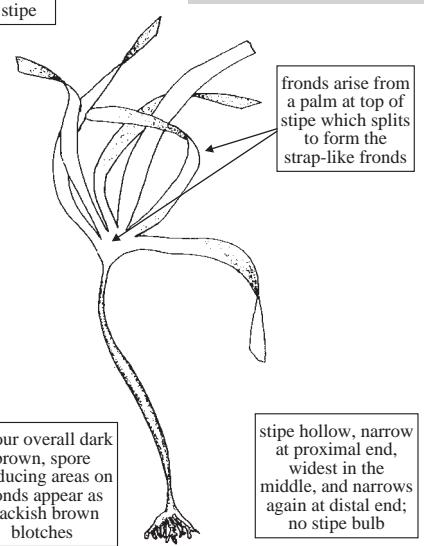
**FAO names:** En - Hollow oar weed; Fr - Lamineire du Benguela;  
Sp - Kombu de Benguela.

**Local names:** Sea bamboo, Kelp.

**Size:** Very large, made up of 3 components; the holdfast up to 30 cm diameter, the stipe up to 5 m long and the fronds up to 2.5 m long.

**Utilization:** Species of *Laminaria* are widely used for alginate, pharmaceuticals, and human and animal food. In Namibia, *L. schinzii* was exported to Taiwan for food from 1987 to 1989. Beach cast is also collected for an animal feed supplement. Recommended harvest method is to cut the fronds 2 cm above the palm every 4 months. Recent experimental harvests yielded 137 t (wet weight) from the Lüderitz Peninsula.

**Habitat and biology:** Endemic to southwestern Africa; in Namibia, from Orange River north to Rocky Point. Grows from the low water mark to a depth of about 25 m, in very dense stands of 12 plants/m<sup>2</sup> in shallow exposed sites. Sporophyte phase is large, macroscopic, and the gametophytes are microscopic.

*Ecklonia maxima* (Osbeck) Papenfuss, 1940

**FAO names:** En - Sea bamboo; Fr - Bambou de mer;  
Sp - Bambú de mar.

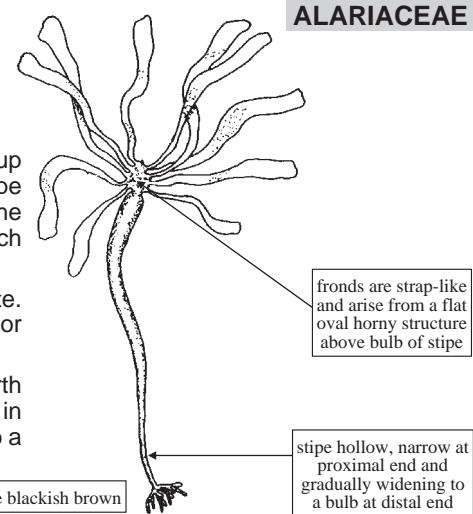
**Local names:** Sea bamboo, Kelp.

**Size:** A very large seaweed composed of 3 parts; the holdfast up to 30 cm diameter which secures the plant to rock, the long stipe which can attain 5 m in length (on the Namibian coast), and the fronds which arise from the distal end of the stipe and may reach 2 m.

**Utilization:** In South Africa used for plant fertilizer and alginate. In Namibia quantities are limited but beach cast is collected for use as an animal feed supplement.

**Habitat and biology:** Occurs from the Orange River as far north as "Saddle Hill south" 80 kms north of Lüderitz. It is found in semi-exposed rocky bays and inlets from the low water mark to a depth of 7 m. Same life history as *Laminaria*.

colour fronds usually yellowish brown while stipes, particularly in older plants are blackish brown



## Division CHLOROPHYTA - Green Algae

*Ulva* spp. Linnaeus

morphology varies from ovoid to elongate

delicate texture

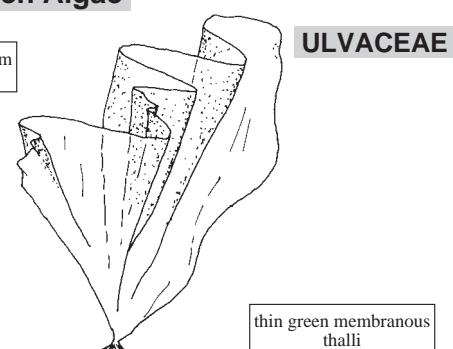
**FAO names:** En - Sea lettuce; Fr - Laitue;  
Sp - Mantilla.

**Local names:** Sea lettuce.

**Size:** Average 3 cm.

**Utilization:** Used for human consumption in the Far East. Not yet used in Namibia.

**Habitat and biology:** Occurs from the Orange River to the Kunene River in the intertidal zone. Growth is more prolific in sheltered habitats and rock pools. One macroscopic phase and 2 free living microscopic phases.



thin green membranous thalli