



PLANTS from the Ocean

Botany students from the University of Namibia survey the seaweed diversity along transects at Lüderitz.

Namibia has one of the richest seaweed fields on earth.

Seaweeds belong to one of the more primitive groups in the plant kingdom – the algae. Although primitive in evolutionary terms, they range not far behind land plants in diversity of form, structure and chemical composition. Attached to different objects or free floating, they grow at varying depths in the sea.

Seaweeds occur in all shades of colour, depending upon the types and quantities of pigments and the nature of the environments in which they're found. Besides varying in colour, seaweeds show a wide range of different forms. Some seaweeds appear as spherical balls, some are like leafy plants, others are like threads, while others are feather-like, spongy or crust-forming.

All these different shapes and forms are adaptations to the strong forces imposed on the plants by the sea. Strong wave action favours cushion shapes, crust-forming algae and seaweeds with strong flexible blades (the leaves of a seaweed) and holdfasts.

Seaweeds growing in the intertidal zone have to cope daily with being submersed under water for several hours and then being exposed to the sun. Some seaweeds have adapted to the sudden change of being totally dry to being covered by water shortly thereafter by surrounding their cells with a water-absorbing substance called mucus. This way only the mucus swells and shrinks, while the cells maintain a stable water balance.

The largest seaweeds, called kelp, can grow up to 40m in length. Kelp usually occurs in cold water, such as along the Namibian coast. The smallest seaweeds reach only a few millimetres in length.

The diversity of seaweeds along the Namibian coastline is captivating. The major cause of the rich seaweed flora at the Namibian coast is the Benguela current and strong offshore winds, which bring cold, nutrient-rich water to the surface regularly – in a process called upwelling. Not only seaweeds, but also fish and other consumers higher up in the food chain – such as birds and humans – benefit from these nutrient-rich waters.

Although seaweeds have great economic potential, they are only marginally harvested for industrial uses in Namibia at the moment. The utilisation of seaweeds other than by the fishing industry, which contributes largely to the Namibian economy, is still in its early stages.

Seaweeds contain several types of gel-forming substances, termed agar, carrageenin and alginates, depending on their chemical composition. These are mainly used in the food industry. Most puddings and chocolates – even beer – contain seaweed in some form. Seaweed extracts are essential ingredients in microbiology, cosmetic and pharmaceutical production, as well as in the paper industry. Lesser known uses of seaweeds include traditional medicine, soil stabilizers, fertilizers and fodder.

During times of despair, such as World War II, more people became aware of the different ways in which seaweeds could supplement food for humans and animals. Apart from gel-forming substances and pigments, seaweeds contain large amounts of protein, vitamins and trace elements such as iodine, which is in short supply in the diets of many people in the north of Namibia. Fresh *Porphyra* plants, a well-established food source in the Far East, contain about 20% protein (in comparison, eggs have only 12%).

Seaweeds have long been a food source for humans in countries like Japan and China. Many Japanese, Chinese and Philippine dishes include seaweeds as the main course. Many Namibian seaweeds have great economic potential. Several species of red algae, which contain high quality carrageenin, are abundant, and some green and brown algae show promise. Sea lettuce (*Ulva* species) can be eaten raw in salads, for example. At present only the red algae *Gracilaria* and the brown version *Laminaria* and *Ecklonia* are harvested commercially from beaches in Luderitz. But care needs to be taken. There is always the danger of over-utilising this natural resource if the seaweed industry were expanded.

Seaweed farms provide a healthy alternative to harvesting straight from the sea. Seaweed farming on the African continent was successfully introduced in Tanzania some years ago. Involving the local people in villages along the coast was the key to success. Today, seaweed farming is the major income of many families in coastal villages. There is no reason why the Tanzanian success story could not be repeated in other developing countries offering similar conditions.

Cultures of *Gracilaria* are farmed in Luderitz. This precious seaweed (Namibian *Gracilaria* populations yield one of the best quality agar on the world market) is harvested and processed for an eager market. Perhaps other seaweed species will share its popularity in the future.

Studying the seaweed flora of the Namibian coast is a prerequisite to marketing it. At present we know very little about the abundance, distribution and life cycles of most seaweeds. And we know even less about the effect of human impact on the seaweed flora. A monitoring programme to study the effect of fines disposal (finer fraction of mine material) which are deposited on marine communities at Elisabeth Bay has just been established by the University of Namibia and outside experts. Apart from investigating the impacts on marine life, better knowledge about some of the economically important seaweed species could be gained throughout the monitoring process. Many more projects along this line are needed to create a database which could be used for conserving, managing and farming seaweeds along the Namibian coast on a sustainable basis.



by Antje Gunster