The sight of a small team of women moving systematically across the rocky shore at low tide on the eastern Cape coast invariably arouses the interest of anglers and passers-by. When the women are seen to be wearing brightly coloured tunics bearing logos, and filling large bags with seaweed, this interest often turns to concern.

In fact, these women are harvesting the reddish-brown tufts of the seaweed, Gelidium pristoides, for the extraction of agar. Not only are these activities sanctioned by more than seven years of research carried out at three independent institutions, but the harvesting activities are monitored by local Nature Conservation inspectors.

The seaweed extract, agar, is a carbohydrate that forms a gel when mixed into solution, even in very small quantities. The word comes from “agar-agar”, the Malay expression for the red seaweeds that produce this substance. Agar is used as a gelling agent in a wide variety of foods, particularly in the East. However, it is irreplaceable in the culture of bacteria and fungi in medical pathology and in microbiological research where it is used as a neutral medium to which nutrients can be added.

Agar was discovered by Minoya Taraenmon in Japan in 1658. It was first used as a bacterial culture medium by a Dr Walter Hesse in Germany, in the 1870s on the suggestion of his wife, Fanny Hesse.

It appears that she heard of the gelling properties of agar-agar through her family contact with the Dutch East Indies.

Agar is produced in useful quantities by several red seaweed species, but the agar from the genus Gelidium is generally of a high quality, and Gelidium pristoides in particular produces large amounts of a very high quality gel. This species is endemic to southern Africa, and occurs between Kommetjie (on the Cape Peninsula) and the Transkeian Wild Coast, where it is often one of the most abundant seaweeds in the intertidal zone. It has been harvested in the eastern Cape between the Kei River and about Mossel Bay for at least 35 years. At present 70-80 tons of the dry seaweed are collected annually. At the same time, harvesters collect 10-20 tons of three other...
Geldium species, *G. ptilidifolium*, *G. amansii* and *G. capense* from gulleys and rock-pools. However, these species are found mostly below the low tide level, where no collecting occurs. On the Wild Coast, the harvest comprises mainly species other than *Geldium pristoides*.

The harvesting of *Geldium*, like that of any marine resource, is controlled by the Sea Fisheries Act. Provisions under which the permit is issued require the presence of a supervisor and that harvesters wear clear identification bearing the logo of the company holding the concession. Harvesters are not allowed to collect any other marine life, a rule that is strictly enforced. Nevertheless, the concession-holders have on several occasions been blamed for illegal activities, which, after investigation, turned out to be the work of other, unidentified parties.

The company holding the concession for *G. pristoides* in the eastern Cape employs 40-60 harvesters who work for about a week at a time over each spring tide period (effectively about 15 days). Almost all of the harvesters are women, and all come from impoverished rural communities. They are paid a wage plus commission on the weight of the seaweed they collect and basic foodstuffs are provided.

After harvesting, *Geldium pristoides* is dried, and sorted. Most of it is eventually exported to Japan, where it fetches about US $2800 per dry ton. The bulk is used to produce "natural agar" for home cooking and traditional confectionery. This highly-prized extract is obtained using the traditional method that gives agar the name "kanten" (frozen sky) in Japan. The seaweed is boiled and the liquid drained off and placed in trays out in the open fields so that it will freeze at night and thaw during the day, a process that depends on location and season. Repeated freezing and thawing causes the water to drain off, and the agar can then be dried for sale.

Largely as a result of public concern about the possible harmful effects of this harvesting, *Geldium pristoides* is probably the most studied seaweed in southern Africa. Research by Sea Fisheries, Rhodes University and the University of Port Elizabeth has produced some seven scientific publications and numerous internal reports. This work was summarised at the first international workshop on *Geldium* in Spain last year. This workshop revealed that although South Africa produces only a tiny fraction of the world’s commercial *Geldium* harvest (most comes from Spain, followed by Morocco and Japan), local research has been the most thorough with respect to the ecological effects of harvesting. *Geldium pristoides* grows on the shells of limpets and barnacles as well as on rock. Harvesting is by hand-picking. Because the plants are very securely attached, only part of each tuft is removed. The remainder, the tufts of seaweed and which form part of the diet of certain fish and shore birds, are not affected. Some complainants have gone so far as to blame *Geldium* harvesting for the decline in fish catches at their favourite angling spot. These concerns have been addressed by scientific investigations. In a three-year study at Port Alfred and Seaview, near Port Elizabeth, *Geldium pristoides* was picked from the same marked areas every three months, to simulate the highest possible intensity of commercial harvesting. At the end of this period, the plant and animal communities (including *Geldium*), were not significantly different from those in unharvested control areas nearby. A study of the many species of small animals (0.2 to 4 mm in size) that live on or among the fronds of intertidal seaweeds revealed that none lived specifically on *Geldium pristoides*. Hundreds of individuals comprised mostly amphipods and isopods (tiny relatives of crayfish and crabs) and snails, as well as nematodes, other crustaceans and even insect larvae, occur in tufts of all seaweed species in the eastern Cape intertidal zone. In any area of shore, less than 3% of these animals live on *Geldium*, while the vast majority live among the other species that make up the bulk of the intertidal seaweed community. Considering that during harvesting these other seaweeds are left untouched, and that only about 25% of *Geldium* plants are removed, it is clear that the overall effect on these small animals is ecologically insignificant.

Major food corporations have identified a growing demand among consumers for natural products to replace artificial food additives. Agar already has many uses in the food industry. As an entirely natural product, is likely to be in increasingly short supply on world markets. Although the harvesting of *Geldium pristoides* is a small activity by industrial standards, it provides some employment in an impoverished rural community. In addition, it is one of those rare commercial activities that is sustainable and has ecologically negligible effects.

Rob Anderson is an algologist who has specialised in the biology of economic seaweeds in the Cape. Combining work with pleasure, Rob is a keen scuba diver, and spends much of his terrestrial time as a musician in a traditional Celtic band.

Celebrate the day of the oceans.

*National Marine Day* 6 December

with the Department of Environment Affairs.

National Marine Week is from 1 to 7 December.

The theme this year is "Surf and Sea: The Meeting Place" and focuses on the intertidal zone.

An attractive poster depicting this theme will be released a month before Marine Day and will be made available (free of charge) from Nature Conservation authorities. Booklets on the intertidal zone will also be made available.

Further Information: Department Environment Affairs (021) 402-9911.

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