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Sea Plants

By

Dr Irene Novaczek

Community Fisheries Training Pacific Series 3

USP Marine Studies Programme / SPC Coastal Fisheries Programme:

Training Materials for Pacific Community Fisheries



The University of the South Pacific



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Preface to the Series

The majority of Pacific Island countries rely on the sea as a major source of food. While women are not involved in offshore deep sea fishing, they are active in collecting and gleaning shellfish and other edible sea species from the nearshore areas and inside the reef. Women also prepare fish either for sale or home consumption. In this preparation process, women are involved in cleaning, gutting, cooking and selling various seafoods. In many atoll countries, women are also involved in the preservation of seafood by drying or smoking. In view of women's role in fisheries activities and the importance of seafood in the region, it is vital that women learn not only the correct handling methods for seafood, but also how to use marine resources wisely for the future.

This manual is part of the Community Fisheries Training Series, and is designed to meet the wide need for community fisheries training in the Pacific, particularly for women. The series was originally developed for the SPC Community Education Training Centre (CETC). The fisheries course at CETC began in 1999 as a joint effort with the USP Marine Studies Programme. It was a response by the Centre to meet the needs of women in the region to improve their skills in small-scale fisheries activities. The USP Post Harvest Fisheries Project was also working to provide post harvest fisheries training for men and women in the region; hence the joint venture between the two institutions in 1999. The two groups of women who have since been through the course have found the training interesting and useful.

Since its inception in 1999, the course has been taught jointly by the USP Marine Studies Programme staff in Fiji Islands and the SPC Community Fisheries Section staff based in New Caledonia. Funding has come from Canada, New Zealand, Australia and the International Ocean Institute - Pacific Islands.

I wish to acknowledge the assistance and major contribution by Tony Chamberlain, Lecturer of the USP Marine Studies Programme/Post Harvest Fisheries Project; Patricia Tuara, previous SPC Community Fisheries Adviser; Lyn Lambeth, SPC Community Fisheries Officer and other trainers in previous years.

I am grateful to the Marine Studies Programme technical staff who have given their time to training women and also the USP for facilities and equipment used during the course. I acknowledge Dr Jimmie Rodgers, Senior Deputy Director-General of SPC in Suva and the SPC Management for supporting CETC, by providing facilities and resources towards the implementation of the Fisheries course. We hope you enjoy this manual in the series.

Best wishes for a successful fisheries training programme.

Nu'ufou Petaia

Principal

SPC Community Education Training Centre (CETC) Narere, Fiji Islands

March 2001

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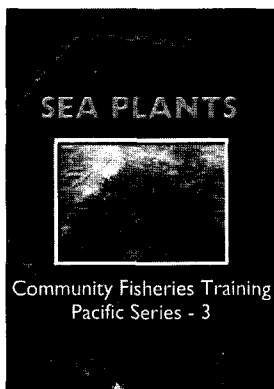
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The people of Nakalawaca, Namara and Ucunivanua villages, for providing valuable information and helping to develop and test recipes.

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Sea Plants

Community Fisheries Training - Pacific Series 3



How to use this book

This book provides a short course on the common edible and medicinal sea plants of the South Pacific and their uses. The aim is to increase the knowledge of the various uses for sea plants and to assist people in identifying the many edible and medicinal sea plants in the region.

Each chapter can be used as a resource for a brief workshop. At the end of each chapter is a list of suggested discussion questions and activities. Feel free to develop other topics and activities to suit your needs. The primary resource books for this manual are “A Guide to the Common Edible and Medicinal Sea Plants of the Pacific Islands” and “Sea Vegetable Recipes for the Pacific Islands”.

The recipes are presented as examples of how to cook with sea plants. When working in remote villages, facilitators may find there is no source of certain store-bought goods used in the recipes. In this case, we encourage the use of local substitutes. Most of the recipes can be altered to suit local tastes and available resources. Please experiment.

Objectives

1. To share knowledge about sea plants.
2. To provide information on how to use sea plants for food, medicine, agricultural aids and for economic purposes.
3. To promote the use of sea vegetables in communities where fresh vegetables are difficult to obtain.
4. To raise awareness of sea vegetables as healthy and nutritious foods.
5. To enable readers to develop workshops on sea plants in their own communities.

If, when using this book, you discover the local names for some plants, find a new edible sea plant, or develop a new recipe, we would love to hear from you and include your information in a future edition of this book. Please contact Tony Chamberlain, Marine Studies Programme, USP, Suva, Fiji Islands.

Chapter One - Sea Plants Have Many Uses

Introduction

What are sea plants?

Sea plants or seaweeds, as the names suggest, are plants that grow in the sea, and are different from plants that grow on land. Sea plants do not have flowers like many land plants do, and are covered in saltwater at least some of the time - something that would kill most land plants.

There are three main groups of sea plants: red, green and brown. The red ones are the trickiest to identify. When they grow in a sunny place they can appear green or yellow, but when they grow in darker places they look purple, brown or even black. Look carefully at the tips and at the base of a sea plant - if you can see a little pink or red, then it belongs to the red group. Brown sea plants are always brown, greenish brown or yellowish brown. Green sea plants are always green, unless they have been bleached white by the sun.



Sargassum is one of the most valuable sea plants, useful for food, medicine, fodder, fertilizer and body care products.

Sea plants are good to eat

More than 500 kinds of sea plants grow in the South Pacific region. In most countries, people eat only a few of these plants - the ones that are more popular and more plentiful. For instance, in Fiji, approximately eight types can be found in the markets. People do not realise that many more sea plants - perhaps as many as 100 in the South Pacific region - are good to eat. We call these "sea vegetables".

Why should we eat sea vegetables?

Sea vegetables are usually eaten because people like the taste. However, sea vegetables are also a good source of **vitamins** and **minerals**. They are especially important on islands where green vegetables are difficult to grow, or where the soil is poor and local vegetables lack essential minerals. Besides being nutritious, many sea vegetables have medicinal properties. They can help keep you well and help protect against heart disease, diabetes and **goitre**.

Although some sea plants cannot be used as vegetables due to their poor flavour or texture, none are known to be poisonous. Sometimes, though, a person might be allergic to a particular sea plant, just as with other types of food. When you taste any food for the first time, it is wise to try just a little in case you have an unpleasant reaction.

Other uses for sea plants

Sea plants are good for your garden and your animals. Most sea plants,

especially the large brown ones, can be made into fertilizer. Minerals from the sea plants pass into the soil and are picked up by growing vegetables, so your food becomes more nutritious. Your garden may also become more resistant to drought, disease and insect pests.

Animals such as chickens, pigs, cows and goats benefit from having sea vegetables added to their diets. Chickens that feed on brown sea vegetables lay eggs with richly-coloured yolks and **cholesterol**-lowering compounds.

Extracts from some sea plants can also be made into body care products and are especially good for the skin and hair.

Sea vegetables and other seaweeds are not only useful, many are beautiful and can be made into decorations and souvenirs

Best of all, these wonderful vegetables and medicines are freely available. You simply need to learn where to look and when to pick them.

What you can learn from this booklet

These pages contain information about twenty-six of the most common Pacific Island sea vegetables. You will learn how to collect and store them, how to prepare them as food and medicine, how to make fertilizer for your garden and how to make a beautiful sea plant souvenir to decorate your home or share with family or friends.

Activity: Sharing knowledge

To get started, let us look at how sea vegetables are used in our communities.

Divide into groups of 10 people or less, and discuss the following:

- Have you ever eaten sea vegetables?
- What sea vegetables are sold in your local market?

On a large piece of paper, have one recorder in each group list the results of the discussion:

- Number of people in the group who have eaten sea vegetables.
- Types of sea vegetables available in local markets - include country, local name of the sea plant and scientific name. (Scientific names can be found by referring to the pictures in the supplementary guide).

Have each group report back to the class.



Rarotonga: Collecting sea plants.

Chapter Two - Harvesting Sea Vegetables



You find seaplants in many different places.

Where do sea plants grow?

You can find sea plants growing and thriving in many different habitats (or areas). Some like a sandy or muddy bottom, while others are attached to rocks, wharves, reefs or other sea plants. Some require places exposed to waves and currents, while others need sheltered bays.

Sea plants grow within particular temperature ranges. That is why the sea plants you find in the Pacific Islands are different from those that grow in the colder waters of Japan or New Zealand. Most of the sea plants featured in this book are found in all Pacific Island countries, but there is one (*Cladosiphon*) found only in Tonga and New Caledonia, where water temperatures are relatively cool.

Sea plant distribution also depends on depth, saltiness of the water and light levels. Some grow close to the mouths of rivers, but most require the saltier water of the sea. Some can tolerate exposure to the air during low tide, and even heavy rain or hot sun. The more sensitive ones, however, must be covered by seawater all the time. Some do well in the full sunshine of the shallows, while others are found under rock shelves, beneath other plants or in deep water. Brown and green sea plants are the most common ones found in intertidal and shallow habitats, while many red sea plants prefer greater depths.

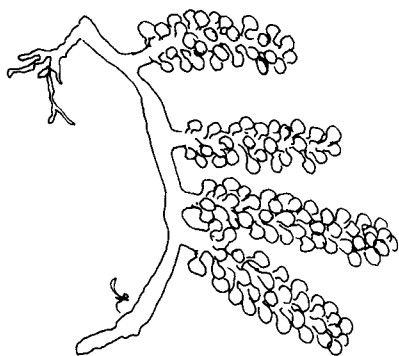
Like land plants, different sea plants have their own seasonal growth pattern. Although some are found year round, others appear only at certain times of the year.

Knowledge about where and when to find sea vegetables is handed down from generation to generation within fishing villages. Favourite harvesting spots are often kept secret.

Where to collect

You can collect sea vegetables from the rocks, shells and reefs where they grow, or you can walk along the beach looking for sea vegetables freshly cast up by the sea. Beach collecting is best just after a storm.

Some sea vegetables grow on reef flats and sandy areas that are exposed during low tide. Others grow on reefs or flats that are always under water. The best time to go harvesting is when the tide is low, so



Caulerpa are delicious, but delicate and must be handled carefully when harvesting.

that the plants are either exposed or in shallow water.

Before going out to look for a particular sea vegetable, check to see whether it is the right season. Some can only be found after a period of cool, wet weather; others will appear during the dry season.

When searching for sea vegetables, be sure to check under ledges and in shady spots. Many delicious sea plants are never seen growing in full sunshine.

Do not harvest from polluted river mouths or city harbours. Also, avoid areas with factories, sewage outfalls, and oil and gas slicks. The pollution contaminates your sea vegetables and makes these places unhealthy for swimming.

Surface bacteria from sewage or manure runoff can be washed off if you are thorough, but factory poisons may actually collect inside the plant.

If you suspect there may be some organic (i.e. sewage) pollution near your harvesting area, always **blanch** sea vegetables before using them in a salad. Blanching, or placing vegetables in boiling water for 2 minutes, will kill most germs.

Equipment

Most sea vegetables can be picked by hand and placed in a sugar sack or basket. For collecting slender and slippery sea plants, you can use a net or strainer.

While many sea plants can be pinched off using just your fingers, you may want to carry a knife or scissors for cutting larger and tougher types, or for scraping off those that lie flat on rocks. Always rinse your tools in fresh water and dry them well to prevent rust.

When walking over coral reef or rubble it is best to wear protective footwear for sharp rocks, coral rubble or spiny sea urchins.

For collecting deep-water plants, you will need to dive. A mask or pair of goggles will help you to see underwater. With fins on your feet you will be able to swim farther and not get as tired. However, you can collect most plants without this extra equipment.

Once you have gained experience, you will be able to recognise many sea plants by how they feel, rather than by how they look.



Check under ledges and shady spots.



When harvesting sea plants, go with a friend.

Stay safe!

Whenever you work in the sea, stay close to a friend in case you get into any difficulty. Before you enter the water, find out whether there are strong currents and waves in that area.

When harvesting far from shore, always take a boat. Wind and waves can rise suddenly and carry even strong swimmers out to sea.

Be careful near coral. Never handle or step on living coral. Not only can many corals give a nasty burn, these animals are home to the fish you eat. If you step on them or break them, the fish will have no place to live. Most corals take years to grow back after being damaged.

Watch for poisonous shells, eels, sea snakes, prickly sea urchins and other dangerous animals. Do not thrust your hand into any place where you cannot see. Before grabbing a clump of sea plants, check whether anything that might bite or sting is hiding inside.

Conserving the resource

Once you have found a good harvesting spot, take care of the delicious sea vegetables growing there so that you can come back again and again. Collect only the cleanest, most tender portions of the sea vegetable. It is unwise to take home what you will not eat, so clip or pinch off the tops and leave the base behind. The base will grow a new top that can be harvested next time.



Caulerpa is a popular sea vegetable that will disappear if you harvest recklessly. Pinch off the edible tops and leave the base to regrow.

Never take all of what is growing in one area. What you leave behind will reproduce and make more young ones. And remember, you are not the only one who enjoys sea vegetables: leave some behind for the fishes and turtles.

It is best to find several harvesting areas, and visit each in turn. Harvest from a different area each time, that way the sea plants in one spot will have a chance to recover. Most sea vegetables will grow back if left alone for 3-5 weeks.

Improving your sea vegetable garden

Sometimes you will find your favourite sea vegetable growing in one place but not another, even though the habitats look similar. Or, perhaps you would like to have it growing in front of your village. It is possible to relocate young plants that are attached to small rocks or shells.

To move sea vegetables, keep the plants covered in seawater or at least wrapped in a leaf and shaded from the sun. You can attract sea plants to a sandy or muddy area by setting out stones and shells for them to

grow on. Some species can actually be tied onto string and staked out on poles driven into the sea bottom.

Gender issues

You may have noticed that in many countries, sea plants are harvested mostly by women. This is because women are often responsible for gathering daily food for the family, along with caring for children and looking after the household. Because they cannot be away at sea for long periods, they gather fish and shells close to shore, and, at the same time, pick up sea vegetables. Knowledge of where and when sea vegetables can be found is passed down from mother to daughter.

Women's fisheries are vitally important to family well-being, especially to children whose health depends on the harvest for healthy sources of protein. Women sell fish, shells and sea plants in the market to earn money for household expenses and school fees. Yet, women's fisheries are not well documented, and women rarely have any influence over the management of coastal waters.

Unfortunately, the inshore regions heavily used by women are especially at risk from coastal development and pollution. Good fishing areas may be filled in, mangroves cut down, waters polluted or reefs destroyed without the consent of the women who depend on them for food and income.

In Pacific Island cultures, women are often reluctant to speak up in public when decisions are being made. Government and management bodies are often composed only of men. Yet, because they know the shallow waters so well, women have information that can be valuable toward making wise decisions. The challenge remains to increase women's involvement in managing and protecting inshore fishing grounds.

Activity

Break into groups (of up to 10 people) to discuss the following:

- Are there polluted areas near your home where you would not harvest sea vegetables?
- Who harvests sea vegetables in your country?
- Have you ever heard of a harvester getting hurt at sea?
- How could working conditions for harvesters be made safer?

Have one member of the group keep notes and report back to the class.

As a class, develop a list of guidelines for safe and sustainable sea vegetable harvesting.

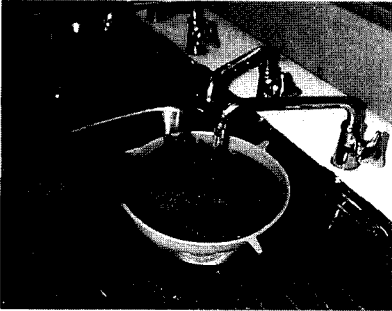


This Caulerpa from the Yasawa Islands is harvested sustainably and supports many families.

Chapter Three - How to Store and Preserve Sea Vegetables

Cleanliness and protection from heat and sun

Select fresh, clean branches or blades. Rinse them well in the sea to remove sand, small shells, sponges and rocks. After picking sea plants, always keep them in a bucket, bag or basket with a cover for shade.

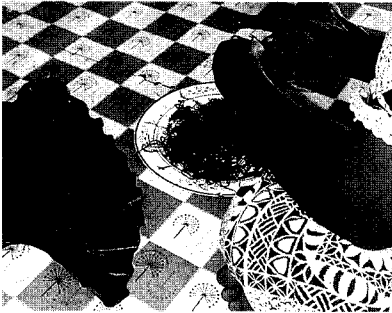


The best water for washing sea vegetables is clean seawater. However, all but the most delicate can also be rinsed in fresh water.

At home, spread out your harvest right away and check it carefully for small animals, shells and dirt. If the sea plant is rubbery and tough, wash it under the kitchen tap or in a basin of fresh water. If it is soft and delicate, wash it gently in a basin of seawater or in fresh water with salt added.

Always use clean drinking-quality water for washing or soaking sea vegetables.

Keep your clean sea vegetables in a clean container (sack, basket, banana leaves, taro leaves) or in a covered bowl in the shade. They must always be damp. If you live near the beach you can keep your sack of sea vegetables in the sea. Attach it to a rope and mark it with a buoy.



Carefully inspect and clean harvested *Acanthorhiza*.

Some delicate sea plants such as *Halymenia* and *Asparagopsis* cannot be kept in a bowl of water or in a sack because they quickly lose colour and fall apart. These must be preserved by salting or drying, or eaten immediately.



Fresh *Pading*, cleaned and ready to eat.



Clean fresh sea plants wrapped in taro leaves can be kept for several days.

Soaking

A few sea vegetables are bitter and should be soaked in a bowl of fresh water overnight before being processed into food. These include *Asparagopsis*, *Dictyota* and some types of *Laurencia*. Soaking removes some of the bitterness.

Dried sea plants should be soaked to bring them back to their original size and shape before being used in salads or as vegetables. Delicate plants such as *Hypnea* and *Acanthophora* need just a few minutes of soaking. Larger plants such as *Gracilaria* or *Sargassum* may need 30-60 minutes to return to their original size. *Eucheuma*, which is very large, is best soaked overnight.

Use clean salty water to soak plants for use in salads or as vegetables. Use as little water as possible: just barely cover them. If preparing a soup or stew, add the water that the plants have soaked in - it will contain valuable minerals and vitamins.

When soaking bleached dried sea plants for use in desserts, use fresh water.

Salting

Some sea vegetables used as spices are salted and kept in the refrigerator for later use. Uniodized or raw salt is best. Recipes for salting sea vegetables are given in the supplementary resource, "Sea Vegetable Recipes for the Pacific Islands". Generally, 1 tablespoon of salt is needed for each cup of fresh sea vegetable. Sprinkle salt on clean, chopped sea vegetable, mix and place in a sealed container until ready to use.

Sun drying

Most sea plants can be spread out on a clean surface to dry in the sun. Properly dried sea plants will keep for years if stored in a sealed plastic bag or jar in a dry cupboard. This is a good way to ensure that you always have sea vegetables at hand, even when they are out of season or when bad weather makes it impossible to collect fresh ones.

A solar dryer made from wood and plastic sheeting dries sea plants quickly, but is not essential. You may simply lay plants out on a clean, flat surface such as a plastic sheet, woven mat, piece of tin or flat rock. Larger sea plants may be pegged to the clothesline.

Turn sea plants over every few minutes at first, then every half hour until they no longer stick to the drying platform. If you have trouble with delicate sea plants sticking to your drying surface, oil the surface very lightly with a small amount of cooking oil.



Sargassum drying on a piece of cardboard.



Acanthophora drying on tin.

As they dry, your sea vegetables will shrivel and shrink - be careful they don't blow away.

If there is threat of rain, gather the sea plants up and take them inside or cover them with plastic. Rain will make them lose their colour, vitamins, minerals and jelling power. Set them out again when the sun returns.

If evening comes and the sea plants are not yet dry, cover them up or bring them inside so they are not touched by dew. Set them out the next day to finish drying.

If the sun goes away before plants are completely dry, drying may be finished in a warm oven or over a cooking fire.

Sea plants are dry when they become warm to the touch. Some will become stiff, but others will remain soft. If they still feel cool and damp, do not put them in sealed containers or the sea plants will go mouldy in storage.

Storing dried sea plants

When they are dry, store sea plants in sealed containers (plastic bag, bottle or other container with a lid). As with any food, protect it from mice and insects. To preserve the colour and vitamins, keep dried sea plants in a cupboard or on a shelf away from the sun.

Drying plants for use as fertilizer

Sargassum, *Padina* and other sea plants used as garden fertilizer can be laid out on grass or concrete to dry. When you want to soak these, use fresh water.



Eucheuma bleached.

Preparing bleached, dry sea plants

Sea vegetables such as *Gracilaria*, *Hypnea* and *Eucheuma* contain a jelly that can be cooked to make sweets. To reduce the seaplant flavour and to prepare white or colourless puddings and jellies, dry then wet these sea plants, repeatedly, until they are bleached white.

Making dried flavour flakes

More delicate species (*Halymenia*, *Ulva*, *Padina*, *Enteromorpha* and tips of *Sargassum*) can be dried to a crisp and then ground into flavour flakes. These are used as a spice or as a replacement for salt. If sun drying does not get them crisp enough to be crumbled into flakes, place them in a dry frying pan over medium heat, and turn them over and over. It should take less than a minute for them to become crisp.

Refrigeration

Some sea vegetables keep well in the fridge (e.g. *Gracilaria*, *Gelidiella*), but others are better off wrapped in leaves and kept in the shade (*Caulerpa* and *Acanthophora*, for example). *Enteromorpha* and *Asparagopsis* can be refrigerated, but should be salted first.

Freezing

Freezing will preserve most sea vegetables. Watery, crisp ones such as sea grapes (*Caulerpa*), *Scinaia* and the *Laurencias* are exceptions, however. These should be eaten fresh.

Only freeze clean, fresh plants. Rinse them in salt water, drain them well, then pack them into small containers with good seals. Many sea plants wilt when thawed, but keep their fresh colour and flavour.

Activity - Sun drying

Collect *Sargassum* (**lecau**). Dry it by three different methods:

- in the sun, on a drying rack
- in the shade, on a plastic sheet or mat
- in a solar dryer.

In each case, turn the plants over every half hour. Collect them when dry and warm to the touch. Which method dries the fastest?

Store the dried sea plants in plastic bags in the cupboard. Use it for making fertilizer (see the Activity in Chapter 5).

Activity - storing sea plants

Collect or buy *Caulerpa* (**nama**) and *Gracilaria* (**lumi wawa**). Divide each into 7 portions.

- Keep one portion fresh by wrapping it in a taro leaf and keeping it in a cool, shady place overnight.
- Expose one portion to the sun for three hours in a sealed plastic bag, then store overnight in the shade.
- Expose one to the sun for three hours in the open air, then wrap in a taro leaf and keep overnight in the shade.
- Place one portion in a bowl of fresh water for one hour, then wrap in a taro leaf and keep overnight.
- Keep one overnight in the fridge, in a plastic bag.
- Freeze one portion.



Enteromorpha dries quickly in the sun.



Padina blades can be sun dried in minutes.

- Add salt to one portion and keep it in a taro leaf in the shade overnight.

The next morning, bring out the 7 samples. Allow the frozen one to thaw.

Which ones are still in good condition? Which ones have wilted or begun to rot? What does each one smell like?

Taste the fresh, salted, refrigerated and frozen sea vegetables. Which do you like the best?

What methods of preservation do you recommend for *Gracilaria*? Are they the same or different for *Caulerpa*?

Chapter Four - Sea Vegetables as Medicine

All sea vegetables are nutritious because of the vitamins and minerals, or **micronutrients**, they contain. Micronutrients include rare minerals that are often missing from poor soil or from agricultural areas where chemical fertilizers and pesticides have been used for years. Many micronutrients in farmed soil have been eroded away and are now in the sea. Sea plants are very good at absorbing and storing these and other useful minerals.

Micronutrients such as **boron**, manganese and iron are essential for health. Boron, for instance, is necessary for proper brain function. A diet deficient in boron can lead to short-term memory and attention problems. Sea vegetables contain a variety of essential minerals such as boron.

People suffering from thyroid conditions (e.g. a swelling in the neck called goitre) lack the mineral iodine. Many sea vegetables, especially the brown ones, are rich in iodine and other major minerals such as potassium and iron. Eating just 5 grams of fresh brown sea vegetables per day can provide enough iodine to prevent goitre.

Another important mineral is calcium, which builds strong bones and teeth, and prevents conditions such as **osteoporosis** (weak bones), which is common in older women. Sea plants such as *Padina* and *Enteromorpha* are good sources of calcium.

The lack of some vitamins also can cause disease. For instance, children who do not eat green vegetables may suffer loss of vision or blindness due to lack of vitamin A. Perhaps they live on a sandy atoll where vegetables are hard to grow and expensive. Green sea vegetables can provide this important vitamin.

The amounts of vitamins and minerals vary with the season and type of sea plant. Some B vitamins and **folic acid** are present in larger amounts during spring and summer; other vitamins may reach a peak in sea vegetables during the winter months. B vitamins and folic acid are higher in red and green sea vegetables, whereas all types of sea plants contain vitamins A, C and E.

Many sea vegetables have medicinal properties beyond their nutritional value. In traditional Hawaiian culture, for example, sea plants are used to treat miscarriage, skin diseases, indigestion and other problems. In the Philippines, sea plants are used as medicine for



Sea feathers (*Caulerpa*) are rich in B vitamins, folic acid, vitamin C and vitamin A. *Caulerpa* contains compounds that can lower the blood pressure.

arthritis, skin diseases and upset stomach. In China, people believe that a diet rich in sea vegetables will suppress hay fever. In Europe, sea vegetable jellies have long been used to feed the ill and elderly, and as a remedy for colds and flu.

Recently, drug companies have tested sea plants to see if they could be used to make drugs. They have found many sea plant extracts that are of value to medicine. For instance, there are compounds in sea plants that control blood pressure, and reduce blood sugar and blood cholesterol levels.

For people at risk of developing diabetes or heart disease, or who are overweight, sea vegetables are a healthy addition to the diet. The Japanese eat more sea vegetables than any other people in the world. It is believed that the traditional Japanese diet, including the consumption of sea vegetables, soy products and fresh seafood, contributes substantially to the low rates of heart disease and stroke in Japan.

Some sea vegetables remove poisons from the body. For instance, **carrageenan**, found in *Eucheuma* and *Hypnea*, can help to remove shellfish poison (saxitoxin). **Algin**, found in brown sea vegetables, removes radioactivity and toxic metals such as lead. There are also sea vegetables that can be used as medicine for children suffering from worms.

Sea vegetable jellies are very good for the sick, the elderly or the very young because they are easy to eat, soothing and bland. Jellies are made from sea plants containing **agar** and carrageenan. Agar jellies have a laxative effect, whereas carrageenan jellies can help alleviate diarrhoea. The amounts of agar and carrageenan in sea plants vary with the season.

Sea vegetable jellies are also good when mixed with fruit juice. These tasty drinks help soothe sore throats, and provide necessary vitamins and minerals.

Because they have few calories, sea vegetable jellies are commonly used to prepare diet drinks. They are filling, but not fattening. In fact, all sea vegetables are healthy foods. What little fat they contain is healthy, **unsaturated fat**.

You can apply sea vegetables to the outside of the body as well. For example, a preparation from large brown sea plants soothes burns and heals cuts, thanks to the algin contained in these plants. Algin is extracted to make burn bandages for hospitals.



Sargassum paste for burns.

In some countries, juice squeezed from the green sea vegetable *Enteromorpha* is applied to bleeding wounds. Many sea plants contain compounds that kill bacteria.

Seaweed extracts are commonly added to skin creams and shampoos because of their beneficial effects. You can even steam sea plants and put them in the bathtub to soften your skin and provide relief from stress.

IMPORTANT! These natural medicines are not as strong as the drugs a doctor might prescribe. Someone with a serious illness should not consider seaweeds as an alternative to medical treatment. It is best to enjoy sea vegetables as a preventative medicine. However, sea vegetables will only be beneficial as a preventative when combined with other dietary and lifestyle changes such as giving up smoking, cutting back on fatty foods and increasing the amount exercise you do.

Activity

Working in groups of 2-4 persons, review the conditions that sea vegetables can help prevent or cure (see the table overleaf). Answer the following questions:

What preventable conditions are common in your community?
Which sea plants could be useful in preventing or treating these conditions?

Look up each of these sea plants in the supplementary guide. "A guide to The Common Edible and Medicinal Sea Plants of the Pacific Islands". Note the countries where they are found, and what kind of habitats they prefer.

Can you think of a place near your home where you might be able to collect these valuable medicinal plants?

Medicinal uses of sea plants.

Condition	Prevention or Remedy	Sea plant used	Add Local Name
Anemia (weak blood)	Eat sea vegetables rich in iron	<i>Ulva, Acanthophora</i>	
Blindness from Vitamin A deficiency	Eat green sea plants rich in vitamin A	<i>Caulerpa, Codium, Enteromorpha, Ulva</i>	
High blood pressure	1) Eat sea plants containing blood-pressure-lowering compounds such as laminine 2) Substitute dried, crushed sea plant powder for salt (it has more potassium and less sodium)	1) <i>Caulerpa, Dictyota, Sargassum</i> 2) <i>Sargassum, Turbinaria, Padina, Dictyota</i>	
High blood cholesterol	Eat sources of carrageenan, fucosterol and alginate	<i>Sargassum, Turbinaria, Dictyota, Padina, Colpomenia, Cladosiphon, Eucheuma, Acanthophora, Hypnea</i>	
Bronchitis and chronic chest infections	Drink a tonic made with carrageenan jellies	<i>Eucheuma, Acanthophora, Hypnea</i>	
Burns (or coral scrapes, cuts and other wounds)	1) Apply a compress made of large brown sea plants: crush or chop the dried plant; moisten and mix with a small amount of fresh, clean water until it feels slippery; and apply as a compress to the wound (fresh sea plants may be used - without the added water - if dried plants are unavailable) 2) Use a compress of sea plants with antibiotic properties to reduce risk of infection	1) <i>Sargassum, Turbinaria, Padina, Dictyota.</i> 2) <i>Ulva, Enteromorpha</i> (from very clean water)	
Cold or flu	1) Drink fruit juices boiled with a sea plant that contains carrageenan 2) Eat sea plants rich in vitamin C.	1) <i>Eucheuma, Acanthophora, Hypnea</i> 2) <i>Caulerpa, Gracilaria, Ulva</i>	

Constipation	Eat any sea plant containing agar or algin	<i>Gracilaria, Gelidiella, Sargassum, Turbinaria, Dictyota</i>	
Diarrhoea	Eat any sea plant containing strong carrageenan jelly	<i>Eucheuma, Hypnea</i>	
Diabetes	Eat sea plants that lower the blood sugar	<i>Eucheuma</i>	
Goitre, gout	Eat or make tea from any sea plant having a high iodine content (you need only 5 grams of fresh sea plants per day to meet your requirement for iodine)	<i>Asparagopsis, Sargassum, Turbinaria, Hydroclathrus, Padina, Colpomenia, Ulva</i>	
Heart disease (or to help prevent heart attack)	<ol style="list-style-type: none"> 1) Reduce blood pressure using natural sources of hypertensive compounds 2) Reduce blood cholesterol by eating sources of carrageenan and alginate 3) Eat sea plants with vitamin B12 to help prevent hardening of the arteries 4) Thin the blood by eating natural sources of fucans and laminarin 	<ol style="list-style-type: none"> 1) <i>Caulerpa</i> 2) <i>Eucheuma, Acanthophora, Hypnea</i>, and any brown sea vegetable such as <i>Sargassum, Turbinaria, Padina, Dictyota</i>, 3) Any green sea vegetable such as <i>Codium, Caulerpa, Enteromorpha, Ulva</i> 4) <i>Sargassum, Turbinaria, Padina, Dictyota, Colpomenia</i> 	
Memory loss, mental confusion	<ol style="list-style-type: none"> 1) Eat sea plants rich in boron and other micronutrients necessary for brain function 	All species	
Obesity	<ol style="list-style-type: none"> 1) Eat sea plants rich in iodine, to stimulate the metabolism 2) Make tea from large brown sea plants containing iodine (drink in moderation or you risk over-stimulating your system) 3) Eat carrageen and agar jellies that fill you up but provide few calories 4) Use carrageen to thicken gravy and stews instead of using fat and flour 	<ol style="list-style-type: none"> 1) <i>Sargassum, Turbinaria, Dictyota, Asparagopsis</i> 2) <i>Sargassum, Turbinaria</i> 3) <i>Eucheuma, Acanthophora, Hypnea, Gracilaria</i> 4) <i>Eucheuma, Acanthophora, Hypnea</i> 	

Condition	Prevention or Remedy	Sea plant used	Add Local Name
Osteoporosis (weak bones)	Eat sea plants rich in calcium	<i>Padina, Enteromorpha, Gelidiella.</i>	
Poisoning by heavy metals or radioactivity	Eat large brown sea plants containing algin	<i>Sargassum, Turbinaria</i>	
Pregnancy	Eat sea plants rich in folic acid to avoid birth defects	<i>Caulerpa, Colpomenia, Dictyota, Hydroclathrus</i>	
Rheumatism	Filipino folk remedy is to eat <i>Caulerpa</i>	<i>Caulerpa</i>	
Shellfish poisoning	Eat sea plants containing carrageenan to remove saxitoxin	<i>Eucheuma</i>	
Skin conditions	Improve skin health by eating sea plants rich in vitamin E	<i>Enteromorpha, Ulva</i>	
Sore throat	Drink fruit juices boiled with a seaplant that contains carrageenan	<i>Eucheuma, Acanthophora, Hypnea,</i>	
Stress	1) Eat sea plants rich in B vitamins 2) Put steamed brown seaweed in your bath and soak in the minerals	1) <i>Caulerpa, Enteromorpha, Ulva</i> 2) <i>Sargassum, Turbinaria, Dictyota</i>	
Stroke or blood clots Tumour, cancer	Thin the blood by eating plants rich in carrageenan Eat sea plants known to contain compounds with anti-tumour activity.	<i>Eucheuma, Acanthophora, Hypnea</i> <i>Hypnea, Codium, Colpomenia</i>	
Urinary disorder or infection	Eat carrageenan jellies	<i>Eucheuma, Acanthophora, Hypnea</i>	
Ulcer	Eat bland, soothing carrageenan jellies	<i>Eucheuma, Acanthophora, Hypnea</i>	
Worms	Eat seaweeds containing natural de-worming compounds	<i>Codium, Ulva</i>	

Some useful sea plants are described in the supplementary book: "A Guide to the Common Edible and Medical Sea Plants of the Pacific Islands". Pictures are included. Notes on their distribution and habitat will help you to know where and when to look for them. Medical, agricultural and other uses for each plant are indicated. How to preserve and cook them is also provided.

When you look at the list countries where a plant has been collected or reported to grow, you will notice that many countries such as Vanuatu, Tonga and Tuvalu are rarely listed. This does not mean the sea plant does not grow there. It means only that no scientist has been there to make a sea plant collection and report it.

You may know of edible sea plants that are not listed here. For example, there are sea vegetables collected from volcanic rock islands in Vanuatu that so far are only known to us by their local names. We have no pictures of them yet and so they have not been included. You can help us make this book more useful and complete by sending dried samples of new sea vegetables along with your favourite recipe, to Tony Chamberlain in the Marine Studies Programme at USP Suva, Fiji.

Activity

Work in pairs and choose one or two of the sea vegetables from the guide to study.

Draw a sketch of the sea vegetable that is big enough for everyone to see, so that you can point out the features that a person should keep in mind when looking for it in the sea.

In your own words, using your picture, present what you have learned about this sea vegetable to the class.

Add any information you have on how this vegetable is used in your community, where it grows and when it is available. Invite other people to share what they know about this plant.



*Spread your sea plants out and look at them carefully.
The more you look, touch and taste, the better you will
learn how to identify them.*

Chapter Five - Other Uses for Sea Plants

Preparing sea plants for use in your garden

Sea plant fertilizers add valuable minerals to the soil and make your garden plants healthy. Gardeners also find that vegetables, flowers and trees grown with sea plants resist diseases and insect pests better than those grown with chemical fertilizers.

All sea plants are good to use in the garden, but ones that are large and abundant are the easiest to gather and work with (e.g. *Sargassum*, *Padina*, *Dictyota*, *Enteromorpha* and *Acanthophora*).

Mulching

After you have prepared your soil and planted seeds, you can cover the ground with a thin layer of sea plants. They help to keep the ground moist and cool. They will slowly break down, adding their nutrients to the soil and helping your vegetables and flowers to grow. Your seeds should sprout and push up easily through the layer of sea plants. Once seeds are up, add another layer of sea plants to make a 10 cm thick layer of mulch. This will help keep light away from any weeds that may try to grow in your garden.



Sargassum makes good compost.

Composting

All animal and vegetable waste eventually rots down and returns to the soil through the action of micro-organisms. A compost heap is an environment where this natural process can be speeded up. The resulting material is rich in nutrients and 'humus' (decayed organic matter, important in soil to help it maintain a free-draining structure).

To encourage a strong population of micro-organisms, a compost heap must have favourable conditions - i.e. food, warmth, moisture and air. Your compost heap must therefore be constructed in a way which allows these requirements. Find a corner of your garden that is out of the way of traffic. If there are chickens, dogs or cats that might disturb your heap, you can build a wire or wooden cage to keep these animals away. The bottom of the compost pile should be directly on the ground so that worms and other good insects can enter.

Start your compost pile with a layer of coarse, dry material such as leaves and small branches. On top of this, place a layer of wet material such as green grass clippings, potato peelings or other kitchen vegetable waste, and sea plants. Cover this layer over with soil, so that it does not get smelly. Then add another layer of coarse, dry matter, followed by wet

matter and soil, repeating the layers until you have a pile one metre high. Then let that heap rest and start a new one.

If it is an open pile, do not include meat scraps or bones because animals will dig through it. You can add meat scraps, bones and fish waste to the pile if it is enclosed in a wood or chicken wire box, but the pile could get smelly and attract rats so it should be far from your house.

If the weather is wet, keep the pile dry under a piece of plastic or tin or coconut fronds. If the weather is too dry, water your compost heap now and then. Once a week, take a spade or fork and mix up each compost heap. After 4 to 6 weeks you will see the whole heap turning into rich, sweet smelling soil. Sprinkle this soil around your fruit trees and in your garden, or use it to fill pots for planting seeds or flowers.

Liquid fertilizer

Young vegetables benefit from being fed with a liquid fertilizer. To make a liquid fertilizer from sea plants, place two large handfuls of sea plants in a bucket of fresh water. Leave it a few days until it rots. The liquid that forms will be smelly, so keep it away from your house.

The rotting sea plants will turn the water dark brown. Never put this dark brown liquid directly on your garden plants. It is too strong and could kill them.

Instead, take a cup of the strong liquid and mix it with fresh water to make it pale yellow in colour. This pale yellow liquid can now be used as liquid fertilizer. Sprinkle it on the leaves of your vegetables every two weeks.

Always do the sprinkling in the early evening when the sun is going down. If you water your plants when the sun is strong, they may be burned. Also, if plants are fed in the evening, they have all night to absorb the goodness through their leaves.

Any solids left in the bottom of the bucket may be dug directly into your garden soil or added to a compost heap.

Feeding sea plants to domestic animals

Animals such as chickens, sheep, cows, pigs and goats benefit from the goodness of sea vegetables too. Sea plants provide minerals and micronutrients, but have little protein. In addition, animals cannot digest many of the carbohydrates in sea plants. Therefore, sea plants should be considered a supplement to the main diet and not used as a staple food.

Mix in one part sea plants to 10 parts of normal food. For instance, if you are giving the pig 10 cups of taro, add one cup of chopped sea vegetables.

Fresh, raw sea plants can be fed to larger animals, but they may need to be chopped up. If boiled food is prepared for pigs, the sea plants may be boiled too. Sea plants can be dried and pounded into small flakes to feed chickens.

Sea plant skin and hair products

The jellies and minerals in sea plants are very good for your skin and hair. Aside from the preparations listed below, the basic sea plant jellies described in the recipe chapter can be used as hair conditioners or massaged into the skin.

Skin scrub

Ingredients:

- Dried *Sargassum*
- Fresh water
- A touch of rose water (optional)

Method:

1. Crisp sun-dried *Sargassum* in a pan over medium heat for 1-2 minutes. Be careful not to burn it.
2. Pound the dry *Sargassum* into a powder.
3. Place the powder in a small amount of clean, fresh water to make a thick paste. Let it rest for half an hour before using.
4. The paste may be stored in a refrigerated jar for later use.

Lumi jelly for skin and hair

Ingredients:

- 4 cups fresh, chopped *Gracilaria*
- Juice of 1 lemon
- 4 cups fresh water

Method:

1. Boil *Gracilaria* in a pot with water and lemon juice until it has dissolved. Leave to cool and set.
2. Keep this jelly in the fridge until you want to use it.

How to use sea plant skin care products

Pick up some sea plant skin scrub with your fingers and rub it onto your skin. Ask a friend to massage it into your shoulders and back. You can use it all over your body, even on your face - but be gentle with your face, don't scrub too hard.

This product is a little rough and will remove dead skin, leaving your skin fresh and soft. It may sting a bit at first, but then it will soothe any rashes or insect bites.

Once your skin has been scrubbed, pick up some lumi jelly and rub it in as well. This will soothe and soften your skin.

Let the mixture dry on your skin until your skin feels tight. Rinse it off with cool clean water. Don't use soap.

Pampering your hair

Take one or two handfuls of lumi jelly and rub it into your hair and scalp. Massage it into your head. Use enough so that all your hair is thoroughly covered.

Put a small towel in a basin of hot water. Wring it out and wrap it around your head. The water should be hot but not boiling - be careful not to scald yourself.

Leave the seaweed and towel wrap on your head for at least half an hour. Rinse out with clear cool water. Do not use shampoo.

Sea plant bath

Put two large handfuls of dried *Sargassum* into a pot and pour boiling water over them. Let the sea plant steep in the boiling water for 5 or 10 minutes.

Pour the *Sargassum* and hot water into your bathtub, and fill it with warm water. Lie in it and relax for as long as you can. You can also add a handful or two of lumi jelly to your bath water.

Making a dried sea plant collection for your village

One of the easiest ways to remember which sea plants are edible or medicinal is to keep a collection of dried sea plants. To see the shape of the sea plant properly, and to provide space for writing down the name, uses and where to find it, press your sample onto a sheet of paper following the method below.

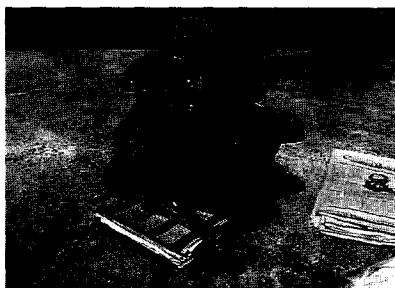
Equipment

- Sheets of white paper, preferably thick paper but any paper will do.
- A shallow pan big enough to hold a sheet of paper, filled with fresh water to a depth of about 2 cm.
- Some flat hard board, piece of glass or plastic that fits in the pan and can support the sheet of paper.
- A pair of forceps, a knitting needle, a small paintbrush or small sticks to use to arrange the sea plant on the paper.
- A pile of newspapers.

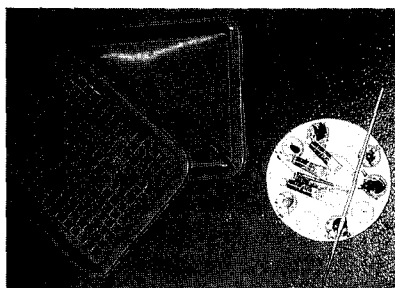
- Sheets of box cardboard cut into rectangles larger than the sheet of paper.
- Pieces of light cloth, cut to fit over the sheets of paper.
- Bricks, large books or other heavy weights, or a plant press (see photo).

Method:

- Select a clean example of the sea plant you want to press.
- On the lower right hand corner of a sheet of white paper, write with a pencil the following information: name of the plant, local name, where and when to find it, medicinal uses.
- Put the flat piece of glass, plastic or whatever you have in the bottom of the pan of water, and lay the paper on top of it, in the water. Arrange the sea plant on top of the paper. Use the brush, sticks or other tools to spread it out so you can see its shape and colour. If it is too big for the paper, cut it short. Take hold of the flat sheet under the paper and pull it out of the water slowly, together with the paper and the sea plant. Let the surface water run off.
- Lay a piece of cardboard down, with several layers of newspaper on top. Carefully pick up the paper with the sea plant on it and place it on top of the newspaper.
- Cover the sea plant with a piece of cloth. Cover the cloth with a layer of newspaper.
- Start again with a new piece of paper and another sea plant.
- Keep building up the layers. After every 3 or 4 sea plants, put a layer of cardboard.
- When the pile is complete, move it to a sunny, airy location and place heavy weights on top to squash it. You can also use a plant press. If you use a press, stand on the pile while you tighten the strap so that is properly squashed.
- After several hours, open the pile and replace the wet newspapers with dry ones.
- After 24 hours, replace the papers again.
- In 2 or 3 days the plants should be dry. Carefully unpack the press and gently peel away the cloths from the surface of the sea plants.
- Store dried, pressed samples in a dry cupboard. If you have a problem with mould, burn a tiny lightbulb in the cupboard with your specimens to keep them dry.



Place heavy weights on your plant press.



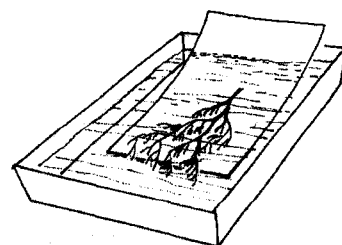
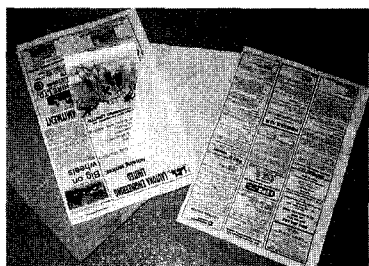
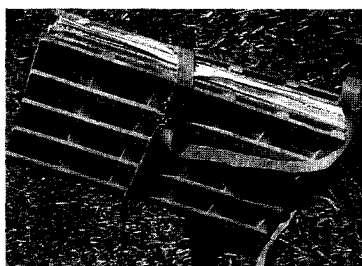
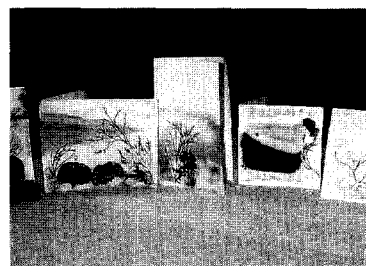
Water pan, water colour paints, brushes.

Making sea plant souvenirs

To make an attractive greeting card or souvenir follow the same steps as for pressing sea plant samples (see above). However, you need much thicker paper, and some watercolour paints. Thick watercolour paper, watercolour paints and small paint brushes are available in many book shops and stationers.

Method:

- Use the water colours to paint a background for your sea plants. It can be a seascape or abstract, or perhaps you prefer to just paint a border and leave the centre white.
- Allow the paint to dry.
- Place the painted paper in the pan of fresh water and arrange a delicate sea plant on top.
- Carefully slide the paper out of the water without disturbing your arrangement. Let surface water run off.
- Place the paper on top of a layer of cardboard and newspaper, then cover it with a cloth.
- Add another layer of absorbent paper and continue to make your layers.
- Press and dry your papers as described above.
- Mount your dry, pressed art work on stiff bristol board to make attractive greeting cards, or frame them to hang on the wall.
- Always keep pressed sea plants dry and out of direct sunshine.

*Painting a background.**Arrange a sea plant on the painted paper.**Place card between cloth, newspaper and cardboard.**Place in a plant press.**Greeting cards.***Activity**

Chop a handful of dried *Sargassum*. Place it in a bucket and cover it with clean, fresh water. Let it soak overnight.

What happens to the dried sea plant when it is put into fresh water?

Pick up the soaked *Sargassum*. How does it feel? The slippery coating on the surface is called alginate. Alginate has many useful properties. For example, this is the compound that helps to heal burns. Finely mashed and dried *Sargassum* can be soaked in clean water and placed over a burn or cut. It is soothing and antiseptic.

Add more fresh water to the bucket. What colour is the water now?

This water contains valuable minerals from the sea plant and can be used as fertilizer. However, it also contains compounds called tannins that can burn your garden plants. It is the tannins that colour the water brown. Before treating your garden with the *Sargassum* water,

dilute it with more fresh water until the colour is a pale yellow-brown. This is the proper strength.

Take some of this liquid for use in your garden. Plants will absorb minerals through their leaves if you water them in the evening after the sun has gone down. Or, you can pour *Sargassum* water into the ground and the roots will soak it up. When the water is all gone, spread the remaining solid material on the soil and lightly dig it in, or add it to your compost pile.

Chapter Six - Raising Community Awareness About Sea Plants



Workshops are good ways to raise awareness about sea plants.

One good way of raising community awareness about the many uses of sea plants is to hold a workshop. Workshops can vary from being just a group of interested people getting together informally and at little or no cost, to more formal gatherings which may require more resources and funding.

How to conduct a sea vegetable workshop

- Step 1** Decide why you want to hold a workshop. Is your main purpose to deal with a nutrition problem, to increase variety in local diets, to stimulate development of a small business, or just to have fun experimenting with recipes? What you want to accomplish should direct your choice of participants, materials and venue.
- Step 2** Decide who you want to come as participants. Be sure that these people actually are interested.
- Step 3** Plan your activities (according to purpose, participants, setting and resources).
- Step 4** Determine what supplies and equipment you need.
- Step 5** If needed, apply for funding to buy what you need and to run the workshop. Your departments of fisheries, women's affairs, enterprise development or environment may have some small project funds available. You can look for an NGO to work with, or try to attract a business sponsorship.
- Step 6** Set a date that suits your participants.

Step 7 Check when the tide is low. Once you have a general target, you will have to check to see whether there is a daytime low tide on or near that time when you can collect materials for the workshop. The local fisheries office or university marine science faculty will have a tide table where you can look this up.

Step 8 Pick a venue that has everything you need. Does your plan involve collecting sea plants from the sea? Then you need to have the workshop near an appropriate beach. Go to the site you have in mind and check it out first. Are there dangerous waves or currents, sharp rocks or other hazards? When the tide goes out is there a good large area exposed? What sea plants are available?

Step 9 Hold your workshop and have fun. Don't forget to do an evaluation at the end.



Make sure the tide is low when you go to collect sea plants

Activity

1. Make a pressed specimen of your favourite sea vegetable available from the sea or from the market. Be sure to note on the paper:

- Name of sea vegetable (scientific and local)
- Habitat
- Medicinal use

2. Go to the sea and collect any fine, delicate sea plant you can find. Mount and press it on heavy paper so that it can be folded and used as a card or stood up as a decoration. If you like, you can prepare the paper beforehand by giving it a wash of watercolour, or adding a decorative border using water paints.

Words and Their Meaning

- Agar** - a complex carbohydrate found in many red sea plants, which forms a jelly at room temperature. Agar can be extracted by boiling in water with small amount of acid (lemon juice, vinegar). It is used for many industrial purposes, including production of agar plates for microbiology.
- Algin** - also called alginate, a carbohydrate jelly found in brown sea plants, alginate may be extracted for industrial purposes. One use is to produce dressings for burn victims, because algin promotes the healing of damaged skin. When eaten, algin can pick up and remove heavy metals and radioactivity from our bodies. Algin also lowers blood cholesterol levels when it is included in the diet, and helps to prevent constipation.
- Blanch** - to immerse briefly in boiling water before using.
- Boron** - one of many micro-nutrients necessary for good health. Boron is found in sea plants but may be missing from vegetables grown in poor soil. Boron is necessary for brain function. Without it you may experience poor memory and confusion.
- Carrageenan** - a complex carbohydrate jelly found in many red sea plants. Carrageenan is widely used in food processing, cosmetics and medicines to thicken, to stabilise and to help liquids stay mixed together without separating. It is a common ingredient in diet drinks because, although filling, it mostly isn't digestible and therefore provides no calories. However, people who eat sea plants regularly do develop the ability to digest this jelly. When eaten, carrageenan helps to reduce blood cholesterol levels and also thins the blood, helping to prevent clots that cause strokes.
- Cholesterol** - a fatty substance that can build up on the walls of blood vessels and cause heart disease and stroke. Some sea plants contain substances that help to reduce the cholesterol in the blood.
- Constipation** - a condition in which your bowel is clogged with hard solids and you cannot pass them from your body. Some sea plants contain jellies (algin, agar) that when eaten can relieve constipation.
- Folic acid** - an important nutrient for pregnant women, folic acid helps to prevent spina bifida and other serious birth defects of the spine.

Fucan	- a compound found in brown sea plants that help to thin the blood and reduce risk of blood clots that cause strokes.
Goitre	- a disease related to the functioning of the thyroid gland, which may result in a large swelling on the neck. Goitre can be prevented by including iodine in the diet.
Laminarin	- a compound found in brown sea plants that helps to thin the blood, preventing blood clots that can cause strokes.
Laminine	- a compound found in brown sea plants that helps to reduce high blood pressure.
Micronutrients	- Micronutrients are substances needed by the body in very small amounts. Because the body does not produce them itself, micronutrients must be provided by the diet. Micronutrients are essential for the body to maintain its normal functions. All vitamins and most minerals are micronutrients.
Minerals	- inorganic substances that are used by our bodies and which are obtained from the foods we eat. These include common elements such as nitrogen, potassium, iron and iodine.
Osteoporosis	- weak bones, often leading to a curved spine and humped back in older people, especially women. To avoid this condition you must eat foods rich in calcium and exercise regularly.
Tumour	- a type of cancerous growth. Some sea plants contain anti-tumour compounds.
Unsaturated fat	- fat is needed by the body in small amounts for important functions, but some dietary fats are healthier than others. Unsaturated fats are healthier than saturated fats. Plants are a source of most unsaturated fats, which are heart-healthy and provide essential fatty acids.
Vitamins	- organic substances that are essential for normal growth and nutrition and are required in small quantities in the diet because they can not be synthesised, or made, by the body.

Related Resources

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