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EDUCATION IN 'NO-TAKE' MARINE RESERVES

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SUMMARY

Most educational approaches to the sea concentrate on similarities and connections with previous experience. But the sea is different, very different. The real educational value of marine life, habitats and processes comes from the contrast these offer to general experience on land. Many of our basic beliefs turn out to be merely 'terrestrial predudice'. The shock and surprise of realising this provides a special level of interest and a chance to re-examine deeply-held attitudes.

One large difference is that the sea is much more 'natural' than the land. In most countries, humans have co-evolved with other terrestrial life for so long that the idea of 'natural' is almost meaningless - for land habitats. In the sea, however, 'natural' processes (meaning without any human influence) still dominate in most circumstances. Humans have made changes in the sea, but these are small and local compared to the changes on land. Unfortunately many 'educational' approaches to the sea concentrate on human activities, particularly the errors, rather than the natural processes and life.

'No-take' marine reserves are designed to maintain in full the natural life and processes in the sea. Everything about them centres on this. All human activities (other than observation and study) are minimised. In marine reserves, it is much easier to concentrate on natural processes, to take a mental holiday from human needs, desires and assumptions, and hence broaden our outlook.

Educational approaches to the sea tend to concentrate on existing information and present forms of management and planning. But another large difference in the sea is that our levels of information, understanding, and management are extremely low compared to land. They are so low that anyone, including schoolchildren, can make useful contributions to knowledge and helpful suggestions for better management. Exploration and the first maps, original research and monitoring, and new social ideas are usually the territory of 'experts'. In the sea, even close to cities, anyone can take part - actively and usefully.

'No-take' marine reserves are a very new idea. They are still rare or small in most regions. Simply thinking about the benefits they can provide, puts us directly at the

frontier of marine management and planning. Merely considering what marine habitats exist on the local coast (and how they could be represented in 'no-take' reserves) takes us to the cutting edge of marine ecology and biogeography. Just trying to count the different shells, seaweeds, or worms at a site (without knowing any species names) poses the basic problems of marine biodiversity. If we think about how we could maintain this diversity, using a network of 'no-take' and minimally-disturbed areas, we are at the frontier of marine conservation.

The educational opportunities of 'no-take' marine reserves do not depend on having any. Indeed some of the most interesting and worthwhile lessons come from thinking about why, where, and when we should have them.

INTRODUCTION

Most current 'marine education' focuses on three themes:

- Those that feel optimistic (or complacent) concentrate on **uses** - things we can extract from the sea, or do in it - fishing and aquaculture, shipping and transport, drilling and mining, recreation and tourism, waste disposal, etc.
- Those unhappy about our record of involvement with the sea concentrate on **problems** - endangered species, habitat destruction, pollution, over-fishing, etc.
- Those that were coerced into the business (or are seeking profits) concentrate on **thrills** - wrecks and sunken treasure, man-eating sharks, monsters of the deep, etc. - the large, rare, remote, dangerous and exotic.

None of these approaches directly inform anyone about the sea itself, its natural processes, or the range of habitats and life in it.

Using the idea of 'no-take' marine reserves, we can break away from these restricted approaches, and achieve aims which are

(a) more sensible and objective - i.e. fit the facts better
(b) more interesting and worthwhile - i.e. more educational in the fullest sense
(c) actually easier and simpler (provided you can admit your own prejudices)

The sea is different

The really important educational values of the sea depend on the contrasts it offers to ordinary experience on land. Many things that we think of as basic principles (in physics, geology, and chemistry, as well as biology) are in fact merely *terrestrial* principles. Much of what we do not think about at all, but unconsciously assume from general experience, does not apply in the sea.

Calling our planet 'earth' is understandable because we live on the solid bits, and breathe air. But it is a parochial idea, not a sensible one. This is the only known planet with liquid water. It is unique because of the sea.

Some examples of the differences:

Geography	- there is only one sea, and there is far more sea than land
Geophysics	- the world climate is controlled by the sea (acting on the atmosphere)
Geology	- seabed rocks & sediments are very young (some land is 10 times older)
Physics	- sound travels better than light (pressure than electromagnetic)

Chemistry - everything is present in very small quantities
Biology - marine plants are microscopic, and small ones can shade out the large.

The differences from land should form the basis of marine education.

Children (and adults whose minds are not yet sealed up) find 'different worlds' intrinsically interesting - i.e. they are interesting simply because they are different. This is the appeal of fairy tales, science fiction, remote jungles, dinosaurs, etc. But humans are also snobbish. Because the sea exists on our doorstep now (not thousands of miles or millions of years away) we tend to downgrade its interest, and then ignore it, except for uses, problems and thrills. We can counter this by stressing the differences.

The most important differences between the sea and the land - so far as people are concerned - are inter-related, and basic to the whole idea of marine reserves.

1. HUMAN ACCESS TO THE SEA IS VERY DIFFICULT.

There are only 5 methods by which people can find out about the sea - boats, diving, shore visits, aquaria, and remote instruments. All of these have serious limitations - work from boats is mostly 'blind', diving is very depth restricted or confined to expensive submersibles, etc. Professional scientists create marine laboratories to reduce the costs, dangers and other difficulties of marine access. Anyone interested in marine education should promote and use 'no-take' marine reserves to achieve the same aims.

2. THE SEA IS NATURAL.

Humans cannot live in the sea or stay there permanently. We cannot set fire to it, plough it, build on it, fence it, or most of the things that enable us to modify land habitats. The small, local, shallow water exceptions this major principle just go to 'prove' the rule. Even close to large cities, the sea is mostly 'natural' (i.e. operating in the same way it would if humans did not exist).

We disrupt the sea in many ways, and at an increasing rate - including overfishing, many types of pollution, and various forms of habitat modification and destruction. But disruption and damage should not be confused with positive control.

Compared to land habitats, which we often modify to our benefit (despite many mistakes), in the sea we rely almost entirely on the natural processes. The idea of 'managing' the sea only makes sense in terms of restricting our activities to the level that allow the natural processes to continue. We cannot manage the sea in the way we can manage a town, a farm or even a forest. The best we can do (for the foreseeable future) is act so that it can continue to 'manage itself'.

'No-take' (and low disturbance) marine reserves are ideal for seeing and concentrating on 'natural processes, showing how important these are in the sea and how different and interesting.

IF, but only if, you appreciate that the sea is natural (as a basic assumption) then several very useful points follow:

(a) **it is now much more interesting** - its intrinsic properties are the most important things about it and these are interesting in themselves, because they *are* different and were not *made* different. So to find out anything about how them is a discovery (not just learning), and because they are *different* it will be interesting. There is no need to add anything else. It does *not* have to useful, you do *not* have to be able to 'explain' it.

(b) **it makes sense to maintain (or restore) this naturalness** to the fullest extent possible. We obviously should have at least a representative set (all habitats) which are as natural and accessible as possible and in a form which will be sustainable.

Children (and open minds of all ages) need to be able to learn about the natural properties of the system that is such a large and important part of their world. This is not just educational opportunity - it has survival value.

3. LIFE FORMS AND PROCESSES IN THE SEA ARE DIFFERENT

Life in the sea is very different from life on land. To begin with there are many more life forms (major taxonomic groups). Most of these seem strange and wonderful compared to land or even freshwater life. We are still discovering whole sections of life in the sea. Marine diversity (at group level) should be stressed. Try listing the groups *only* found in the sea - starting with the well-known (whales, penguins, starfish, squid, albratoss, etc.); working on to the lesser-known (kelps, corals and sea anemones, chitons, sea cucumbers, etc.) and then introducing the 'obscure' (bryozoa, sea squirts, brachipods, brittle stars, many worm groups, etc.).

Many more groups are largely confined to the sea (with just a few freshwater or odd terrestrial species). Examples include - sponges, jellyfish, hydroids, nemerteans, copedods, amphipods, crabs, dolphins, gulls, etc.

Not only are there more groups in the sea, marine life often does quite different things from land organisms or achieves them in quite different ways. For example:

- *Microscopic* plants (phytoplankton) are the basis of life in the sea. Large plants like seaweeds, mangroves and seagrasses, despite their obviousness, are restricted to shallow margins and, even there, are often less important. We cannot even see the 'grass' of the sea; it is there in the water but is invisible (without a microscope).
- The first level of animal feeding (herbivory) is therefore usually a *filtering* process. Most of these animals are themselves very small and planktonic - but large sessile ones are also common (oysters, sponges, sea-squirts, etc.).
- The steps in a food chain on land rarely exceed 3 (producer, herbivore and carnivore), but much longer ones are common in the sea (sharks are 5-7 links up the chain), and there are more opportunities for 'cross-links' and 'loops'.
- Most marine species produce some kind of *floating spores, eggs or larvae* which drift away (at the whim of the currents) and only change/grow into 'adult' form at some later stage and some *other* place. So, while the population that produced them did 'reproduce', the resultant young do not join that population. Each population is 'recruited' from whatever larvae drift in with the currents. Image sheep farming if the

lambs drifted off in little balloons and the only ones you gained in the flock were the 'landings' from somewhere upwind!

Because of these large differences, it is unwise to use land-based experience to decide anything about life in the sea. But we keep forgetting this. For example, high-grade ecological textbooks often state that fire is 'the major structuring factor in natural communities'! 'No-take' marine reserves are places where we do not 'decide' anything at all - except to leave it alone and observe what does happen. This offers the best chance to learn and understand the life in the sea.

4. We are very ignorant about the sea

Compared to land, we are extremely lacking in knowledge about the sea and our management systems are in their infancy. Even at the simplest levels the differences in information levels is very great, and for many matters we effectively know nothing. For example:

- Fish are the best known marine group - comparable to birds on land. In the New Zealand region, the list of known bird species increased over the past 30 years by less than 5% (mostly new introductions). Known fish species in NZ went from around 300 to over 1000 in the same period (many of these species were new to science).
- Air temperatures in NZ were being recorded daily at several stations by 1850, but the first routine daily records of *sea* temperatures did not begin until the 1950's.
- Good topographic maps for the whole of New Zealand were available by 1900, but large sea mounts (more than 1000 m high) are still being discovered in this region.

Some of these differences are due to technical difficulties - a farmer looking out of the window each morning gets a clear picture of seasonal grass growth, but in the sea complex sampling, measurements and analysis of phytoplankton are needed to achieve the same level of information. But much of our ignorance of the sea is due simply to lack of interest and even elementary effort. Actual and proposed marine reserves can act as a focus and promote more effort. Anyone can easily improve the level of mapping for a marine area, start describing the habitats, recording the species and monitoring the processes. Existing knowledge is so low, useful information can be generated by schoolchildren on a daytrip; and massive improvements to the knowledge of a marine area can be gained by a small group of 'amateurs' in a few weeks.

Educational aspects of 'no-take' marine reserves include:

1. Personal visits - direct observation and study - by school parties, tertiary students, adult education groups, family parties and individuals.
2. Provision of pamphlets, project ideas, worksheets, etc. to use on site
3. On site interpretations and displays to support and extend personal observation
4. Off-site use - via photographs, videos, books, articles, etc. - allowing indirect observation, study and appreciation of natural marine life and conditions.
5. Research projects - to extend the available information and understanding

6. Monitoring - repeated studies over time - to learn the natural variations and the difference between ‘natural’ and ‘exploited’.
7. Consideration of the principles for marine planning and management in general, and the need for ‘no-take’ reserves in particular.

SOME PRACTICAL POINTS

The key point to recognise and radiate at all times is that in the sea everything is new, different and effectively unexplored. So the all the ‘problems’ are really opportunites. Since ‘the experts’ and ‘the books’ know little or nothing about any particular piece of the sea - anyone can ‘HAVE A GO’ at exploring it and finding out more. Since it is not clear how this should be done, where you should start, or even what ‘the problem’ is; you can pick any piece and ‘DO IT’ anyway you think is sensible.

In ‘no-take’ marine reserves (or when planning them) you are not harvesting or extracting anything except information; you are not building or altering anything except ideas. Provided you accept these constraints, you are completely free. Who can criticise or complain? If anyone does, you can invite them to help. If they do, fine, if not, they are easily ignored.

Most sports, hobbies and recreational activities not only have lots of rules, these are completely artificial. Indeed, this is so true, that many people equate enjoying themselves with activity which is effectively meaningless (except, of course, teamwork and competition with the like-minded). But the sea and its life are very real. Involving yourself with finding out more about it does not have people-invented rules. Any ‘rules’ that exist are made by the sea, though we may have to discover them. Exploring the sea, and trying to describe and understand it better, is a meaningful activity in itself, no other justification is required.

1. MARINE EXPLORATION AND DISCOVERY

The sea is so different from land, any approach to it has the characteristics of an expedition. Instead of minimising these, for educational purposes we should stress them. This not only increases the fun and the interest, it also draws attention to some important points which would otherwise be forgotten or ignored.

When we approach the sea we are visiting an alien environment. Even if the piece concerned is at your doorstep and you have been there many times before, the visit is still an expedition.

You cannot stay there - it is a temporary visit
It is very different - no houses, shops or roads
You must take basic life support with you - not just a ship or a paddle board, a snorkel or dive tank, but food and freshwater.
Not only are *you* very ignorant about it, there isn’t much information available.

Small children, who are very excited about a visit to the beach or a trip in a boat are, in fact, being more objective and sensible than their ‘elders and betters’ who regard such things as routine and ordinary. Expeditions are exciting, we explore the unknown and

unexpected. Whatever you find is intensely interesting. Why do responsible and intelligent adults so often (consciously or otherwise) laugh at and, hence, remove these attitudes - which if left in place, will make 'education' easy and fun?

I suspect the answers are not very complimentary. Adults like to be thought sophisticated, experienced, knowledgeable, in control, unafraid, cool, etc. - especially when they are not. So, even when there are real advantages in admitting our ignorance, we tend to go on pretending. The way out is simple. Play a better game. Become the expedition leader - not the tourist courier. The leader of an expedition may be wiser and more experienced, but is leader by virtue of greater interest plus greater caution.
A leader is not an 'ousider', just the best participant. Teachers and club organisers when involved in marine 'education' should give themselves a holiday from being required to 'know things' and join in the process of discovery. This would not be a pretence adopted for tactical advantage, it would mean giving up a pretence which is no help at all in *marine* matters.

2. Oblique aerial video and photographs

Vertical aerial photography accurate enough to be used in formal maps is a complex and expensive professional activity, but almost anyone can produce interesting and useful oblique aerial photographs of their coast.

It is difficult (even with practise) to appreciate the form, scale, and processes of the coast from the shore or a boat at sea. Maps, charts, and vertical photographs help, but what you really need is a seabird view - what you would see from a moderate height over the sea if you looked inland. It is expensive to take everyone up there, but it is cheap and easy to provide the experience through video or still pictures.

Small light planes (that fly relatively low) can be hired from aero clubs for rates (per kilometre) that are little more than taxi rates. High-wing monoplanes and an open window allow the best views (wear a warm balaclava!). Amateur video or camera enthusiasts (relatively expert and with own cameras) are keen for a free flight. A sunny summer day, near noon, gives the best sun angle and lighting. Low tide and low wave action exposes the most shore. But any reasonable conditions will give useful results.

The plane route should 'follow' the coast i.e.going 'into' bays and 'out' round headlands - but at sufficient distance off-shore to put sea in half the picture frame. The height should be low enough to recognise details in the pictures (may need special permission in some areas), with perhaps a higher level 'panorama' on the return.

The resulting video or picture series should *not* be edited, but used to encourage the widest possible range of 'uses' (from surveying mangroves to inspiring poems).

3. Entity recognition and diversity

The most interesting and most important task in biology is learning to distinguish species. This is NOT the same thing as learning names - which is generally rather boring and much less important.

When professional and highly-trained scientists go on expeditions, much of the life they encounter will be new (undescribed by anyone, anywhere, ever) and most of it will be new to them. They will not know 'names' for most things. What they have to do is distinguish (separate) the species. Is this smaller, different-coloured, more spiky specimen actually a different kind - or simply a variety of that one we saw over there yesterday.

Nobody, however experienced, is infallible at this, and no computer is any good at all yet. Any kind of information may be useful in making the decision (distribution, quantities, shapes, sizes, colours, anatomy, behaviour, associations, etc.) but there are no rules about which bits of data are actually reliable or important. However, the human brain is surprising good at making such distinctions - perhaps because that is one of the prime purposes of brains (identifying food, predators, etc.)!

Anyone can experience this activity in *any* piece of the sea. Some of the distinctions are relatively easy and even six-year olds enjoy deciding how many 'kinds' of shells there are in a drift-line - and they quickly understand that 'left' and 'right' shells of the same bivalve are not 'different'. But subtleties and difficulties quickly appear, and can be considerable. Many small rockpool fish are similar in shape, size, habitat, and behaviour, but differ in colour patterns. However, the males, females and juveniles of the *same* species can also have different colours. Sorting out half-a-dozen species of these can occupy a careful observer for months - even in one bay.

There *may* be books, posters, museum collections, etc. that will tell you the 'answers', but you don't have to spoil the fun by looking at them first. Looking up the answers to crossword puzzles before you have a go does tend to spoil the fun!
In any case for some groups, and some species in all groups, there are no answers yet. No one has done the work. So not only can you 'play' at being a taxonomic expert, you may easily become one without realising it.

4. Habitat description

The same kind of thing applies to marine habitat descriptions, only more so. Although there are marine charts for most places, these are only the equivalent of road maps on land, and they are usually too small-scale to be very useful to divers, snorkellers or for shore studies. If you want to know the marine habitats in 'your bay' you will almost certainly have to describe them yourself.

The bad news is that there is no general agreement on the 'right' methods for describing and defining marine habitats. The good news is that we know many things you *can* use in habitat descriptions and definitions, including depth (or height on a shore); type of substrate (rock, sand, mud etc.); large topographic features (harbours, headlands, submarine canyons, etc); small typographic features (reefs, caves, sand ridges, etc.); dominant or 'characteristic' plants and animals (mangroves, kelps, corals, cockles, etc.); water quality (clarity, salinity, oxygen, nutrients, pollutants, etc.); hydrographic features (tidal range, local currents, up-welling, etc.); and climatic conditions (water temperature, amounts and patterns of wind and wave action, etc.).

We also know that most of the things listed above are related to each other (e.g. if it is shallow and muddy, the waves will be small, the water cloudy and very few kelp plants around), so to some extent it doesn't matter which ones you put top of your list. The sensible way to start is to use whatever seems easiest at your location. This is nearly always the dominant species, especially the ones that don't move - kelps, cockles, worms, mangroves, etc. Remember that organisms integrate over time, you are only visiting. If you observe the life that stays there, you will learn what generally happens.

5. SURVEYS AND ZOOM MAPS

Having described the marine habitats of an area, you can map them. Maps are the best and simplest way to present complex information, but the idea frightens many otherwise intelligent people. Perhaps they look at some beautifully printed and detailed examples and dispair of being able to compete. Reverse this process to give yourself some confidence. Find the best available maps and charts of the bit of the sea you are especially interested in. Then enlarge that bit to at least A3 (A2 is better). Notice how crude and thin the information is *at this scale.* Anyone could improve it without much effort. Use your aerial photos, some echo-sounding runs, and a few test dives.

You can also begin at the other end. Information is scale dependent. A map of Australia contains little useful information about the street you live on, but every child is the world expert on their own back garden. Any person can become 'the world expert' on a square metre of marine habitat by looking at it for a few minutes. Drawing a 'map' (= sketch picture) of that square at one-tenth scale (i.e fitting on a piece of A4) is not very hard. Improving the first version, over the next half hour, is also quite easy (especially if you show your first attempt to others working nearby and copy any good ideas from their efforts).

The process can be repeated at increasing scales - introducing all the 'principles of cartography' without actually mentioning them! Having got a 'map-picture' of a small piece, try doing 10 times the area (with the original bit in the centre) but still fitting the 'map' on an A4 sheet. At first, it seems to be 10 times the effort. Then you notice that the 'problems' are really the 'answers'. Where there is a lot of fiddly detail that is difficult to draw at the new small scale, you simply give that a 'name', run a line round the area where it occurs, and label it. You can't draw every barnacle or cockle at the new scale so you simply map 'barnacled rock' and 'cockle bed'. This is the same as mapping 'forest' instead of drawing individual trees on a large scale plan. The two approaches - 'top-down' and 'detailed-up' - can be linked in relatively easy stages. One maps the distribution of habitats, the other details within habitats.

6. MONITORING

Monitoring is simply recording the way something varies with time at the same location. It can be applied to anything, but is only rarely organised and maintained in a formal system (e.g. rainfall, human population counts, crop yields, etc.).

Once something has been discovered, defined and measured in some way, it can be monitored. This can apply to the amount of sand in a bay, the number of starfish in a pool, the time of barnacle settlement, the number of easterly storms in a year - or anything. Variations can be cyclic (diurnal, tidal, lunar, seasonal) or irregular. The amount of change can be small or large; predicable or not; have severe consequences or virtually no effect - but whatever happens over time is important information.
Anyone can carry out monitoring, it is not usually either difficult or expensive, but very few do so because it take time and needs to be done the same way each time. To scientists this may seem boring and to taxpayers it may seem a waste of money.

They are entitled to their opinions, they are wrong to encourage and perpetuate our ignorance of changes with time. In the sea, virtually nothing is monitored, and anyone can help start the process. Furthermore, monitoring can add great interest to otherwise routine activity. If you visit a shore, pool, or dive site every year (or week, month, etc.), what does change and what stays the same? Which things change most; which changes are 'progessive' (always in one direction)or regular. Which changes coincide, and how reliable is this connection?

All of this can be done at different 'levels' of measurement and precision, the only requirements are the recording of time and place. Even the simplest levels involve subtle thoughts, and the appreciation of important principles.

Last year (last month, yesterday) this pool had 15 starfish in it. Would you expect there to be between 10 and 20 now? How much would you bet on your answer?

Try similar ideas for gulls standing on a reef (highly mobile), barnacles on a rock (immobile but short-lived), large kelp plants (longer-lived), pebbles (non-living but mobile), big boulders, waves above a given size, material in the drift line, etc. Consider the kind of information (if any) that would improve your predictions in each case.

7. PAMPHLETS

The point of pamphlets is to provide information at the time and people want it. To do this, they must be cheap and simple. However, most pamphlets are made to impress someone (head office or sponsors) so they are often produced on special-sized, glossy paper in full colour, with lots of beautiful pictures, and puffy or politically-correct text. They look fine on the office wall, but are virtually useless for any educational or recreational purpose. The glossy paper only needs one drop of water to glue itself together; colour-printing prevents simple photo-copying; and the high costs stops them being made freely available.

Useful (as distinct from impressive) pamphlets are made on ordinary A4 paper, with black and white illustrations, so that they are very cheap to print and can be photo-copied easily. The information included is, as far as possible, given as simple illustrations - maps, diagrams, simple pictures - drawn by hand, traced from photographs, etc. - which are initially done in black felt pen at twice the size needed. On photocopy reduction to the 'right' size, they look very neat! The text, which acts to 'fill in' and link up the illustrations, is produced on an ordinary word processor. This allows many changes in editing, formatting, font size, etc. at no cost at all and very little skill. The final text

layout, with spaces for the illustrations, is 'printed' once on a good laser printer (you take the disc down to some commercial office and pay them a few dollars). The illustrations are stuck on to this 'master' copy, with 'invisible' sellotape. You run off some photocopies, when you want them. Because they are so easy to copy, you only provide one to teachers, club secretaries etc. They can photocopy what they need. And a 'new and improved edition' can be produced in few hours.

Because such pamphlets are so simple, quick and cheap to produce, most of the usual 'problems' simply do not arise. You don't need a sponsor to finance the project, the whole operation is at petty cash level. You don't have to worry about printers, editors, publishers, authors, artists, copyright fees, etc., you do it all yourself. (*Provided* you redraw *and* simplify any illustrations, you do not infringe copyright).
You do not have to be 'expert' or get it right first time. You simply produce a first version, hand out a few photocopies to your class and get them to suggest and make improvements. Then you produce the '2nd edition', the next day.

The biggest 'problem' with pamphlets is what to put in and what to leave out. Space is very limited and everyone has a different opinion as to what is essential. This is easily solved by never planning *one* pamphlet. A single, stand-alone pamphlet is virtually impossible to design and easy to critise. Don't do it. Think about a set, or better still a series of sets. The idea of *a* pamphlet quickly creates agonies of indecision over what to include. Think about set and things get much easier. Then produce the *first* one in the set. The one you like best, know most about, i.e the easiest one. Thinking about a series of sets simplifies things still further.

At the Leigh marine reserve, the first pamphlets were produced by a schoolgirl in 1976 (she is now a senior member of the Department of Conservation) as a set of 'groups' - fish, echinoderms, seaweeds, etc. Later we conceived a series of sets including:

More and smaller groups (e.g. barnacles, shore crabs, thaid whelks, etc.)
Single species (e.g. the 'cats-eye' snail)
Habitats (e.g. intertidal platforms, kelp forest, sea urchin 'barrens', etc.)
Feeding methods (e.g. filter-feeding, predation, scavenging, etc.)
Scenic features (e.g. local landmarks and views)

There are plenty of possibilites and almost anyone can find something they know enough about (compared to the majority of visitors, who know nothing at all). If you want to be impressive, but still keep things practical, controlled and useful, you can build your pamphlet sets into small booklets (with a colour cover if your sponsor insists!), and your booklets into an proper book. But start small and build up. That way you have fun, involve everyone, learn plenty yourself, teach even more, become genuinely useful and stay out debt.

8. On-site displays and interpretation

If you, your class or club, have explored the particular area, got some aerial photographs, investigated some of the living entities, descibed some of the habitats, produced some sketch maps, and maybe even monitored a few things, setting up a display to inform others is not going to difficult in terms of content.

Many attempts at interpretive displays begin by trying to raise money for the stand, planning where to put it and designing the structure. This approach is both hard work and has a strong chance of failing at the last stage. Not only have they got to ask for money without anything to show, but even if it succeeds, they often don't know what to put in the display or where to get suitable material.

It is more sensible to reverse the order. Not only is this more fun and more educational; it involves more people and is more likely to succeed. Even if it doesn't produce a fancy structure in the end, there will have been plenty of other successes. Photos suitable for permanent on-site display can be used in temporary public displays (try a bank foyer), toured around schools, or used in slide shows to conservation groups. Maps that would be the centre piece of a display will be very useful to school parties, boat clubs and divers, even if there is no interpretative centre.

As with most aspects of marine education, the best approach is to do what you can now, and rely on your own imagination and commonsense to suggest such things. Those who want to wait until 'it' can be done 'properly', until a sponsor can be found, or until the 'experts' have approved the project, will often miss all the fun.

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