need to dump the nets. The effect of this rule is to make the prohibition on the disposal of waste fishing nets difficult to implement and enforce, and that MARPOL has little effect on methods of fishing where the accidental loss of plastic fishing nets is high - such as drift gill netting. That means however that what we have to do is focus on ways of minimising the circumstances that can give rise to that provision, and increase the chances of finding the nets the times when they are cut. There are procedures in place and being investigated for marking nets so that the discouragement for dumping is increased, and there's also increased chances of recovery.

New Zealand is not yet a party to MARPOL, and neither therefore to Annex V, although it is our intention to become a party once the necessary legislative measures have been taken to implement the Convention in our domestic law. We are immediately bound the moment we become party to the Treaty, so we must always have the necessary legislation in place beforehand. So the focus now is to make sure domestic legislation squares with the international obligations of both MARPOL and also the Law of the Sea Convention. Annex V is not a problem for us, and is relatively simple to comply with. The problem has been with other provisions of the convention. The Ministry of Transport is the operational department with responsibility for the implementation of the Marine Pollution Act, which needs to be amended before we can become party to the convention.

In general, the effective functioning of rules on the disposal of plastics into the sea, means creating a set of reinforcing measures, not only of exercising legal jurisdiction over ships flying your flag, or within your territorial waters or exclusive economic zone (EEZ), but also creating notification systems, installing reception facilities in port, and educating seafarers to encourage compliance with pollution measures. There are three stages in the enforcement process - discovery of a violation, for example through notification of the discharge of a harmful substance into the environment; conducting an investigation of the alleged discharge; and instituting judicial proceedings. It is impossible to move to this final stage without sufficiently clear and direct evidence of an unlawful discharge. As the most affected party, a coastal state may bring judicial proceedings under its domestic legislation, or turn over any evidence of a violation to the flag state.

MARPOL is geared towards the exercise of flag state jurisdiction. New Zealand has absolute jurisdiction over its flag vessels at all times. New Zealand similarly has a responsibility for the actions that take place on its flag vessels at all times. If we were a member of MARPOL we would take action to require New Zealand ships to comply with the standards set up. If we had evidence of a violation by another country that was party to MARPOL we would turn to them as being the responsible state and pursue a remedy with that state, asking it to take action against its flag vessel. And under MARPOL it will have been required to have taken the necessary legislation at home to exercise that jurisdiction and to make sure it would have been an offence under its laws for any of its ships to have contravened the convention.

The United Nations Convention on the Law of the Sea incorporates the supplemental coastal state right to enforce international pollution norms and standards in the territorial sea and EEZ. A coastal state may institute proceedings if the vessel is voluntarily in port. In the territorial sea, it may undertake physical inspection where there are clear grounds to suppose that the vessel has violated its pollution laws and regulations or international law, and when the evidence warrants, may detain the vessel and institute proceedings. The inherent weakness of any international legal regime is that there is no legal enforcement system that works easily and we have to accept that with the system of relations between states we don't have an international police force to take action in the way that we would act domestically.

Does MARPOL provide for any exceptions in the case of warships?
Yes, there is an exception; as I understand it they're pretty much free.

PLASTIC PACKAGING IN THE NEW ZEALAND ENVIRONMENT

Jeffrey McNeill
Ministry for the Environment

The Ministry for the Environment is currently undertaking a study of the environmental impacts of packaging in New Zealand. This study was initiated in response to proposals to deregulate the milk industry and was subsequently expanded to cover all packaging. The first part of the operation resulted in the publication of an issues and options paper, "Packaging in the New Zealand Environment" in November 1987 which received a lot of public interest. In response, 127 submissions were received, from industry, local and central government and private individuals.

Since then the packaging team has changed its personnel completely, and has addressed what's been perceived as gaps in the first study. We've been looking into the economic implications of packaging and on the differential impacts of packaging types. After a number of delays we're still confident of our final timetable which is reporting to Government and making recommendations by the end of March.

Packaging is a very visible component of our consumer society and draws strong reaction. It is seen as an example of fast resource throughput, and hence wasteful resource use. And a lot of concern is raised because considerable amounts of packaging are used only once before being discarded.

Packaging also makes up a large sum, between 40 and 70 per cent, of the litter stream, which in itself is a very emotive subject for many people and generates considerable public concern. On top of which we find there's a constant introduction of new packaging materials, especially those using plastics, such as PET (polyethylene terephthalate), used for beverage containers. These new packaging materials tend to be neither recycled nor are they biodegradable in many cases, or at least not in the short term. As a result of this, there's been a lot of concern and the public often call for intervention of various sorts by government to solve these perceived environmental problems - suggesting popular overseas approaches like bottlebills, mandatory deposits on beverage containers and government-supported recycling schemes. Our concern is that a number of these proposals tend in isolation to be ad hoc, and we're not convinced that they'll actually work and have the desired outcome. So we've tried to go back a couple of steps and put the issues in a wider context, that is, putting packaging within the context of waste management. Litter should also be seen as part of waste management rather than as a separate identity. Such an approach is important; although it can be useful to identify sources and types of waste in order to target specific actions if necessary, it is the nature of the waste itself which determines the nature of impacts on the environment.

Another reason for not considering packaging in isolation is that it only constitutes about 40 per cent of domestic refuse (on the basis of research done for us by Tong and Associates). We discovered that the average rubbish bag in New Zealand contains about 20% by volume of newspapers and mailers; cardboard, paper/plastic film together only make up 16%. Any policy which tackles packaging waste only, may accordingly be unsuccessful in realising its goals as well as being discriminatory in application. If you really want to solve some of these problems you may be interested in moving into something like composting, as vegetable waste takes up a far larger chunk of the wastebag than packaging.

There are different philosophies on how to achieve sustainable development which are central to the issue of waste management, and it's important to acknowledge that a dialectic exists and that our recommendations are made within this context. The debate revolves around minimum resource throughput (and hence the need for recycling and use of one particular component of material as much as possible), as opposed to ensuring efficient use of resources.

Within the packaging issue itself we recognised that there are a number of problems to which packaging contributes:
1. regional concerns over lack of disposal sites;
2. litter;
3. hazardous residual contents;
4. hazardous packaging material, eg PVC; and
5. equity considerations.

The main problem that plastic packaging poses as marine litter seems to be the hazard it causes to wildlife, which can ingest or become entangled in it. A secondary problem is the visual pollution of packaging, where you go to what should be a pristine environment and you're suddenly seeing lots of plastic all over the beach.

Plastic packaging seems particularly bad because it's durable and persistent in the environment, it constitutes a large proportion of total marine litter, and because it is easily and widely dispersed.

However other packaging types are also significant. The aluminium cans that beer and other carbonated beverages come in can last up to 4000 years in the ocean, which makes the 450 year lifespan of plastic yokes somewhat small. Glass can last almost indefinitely, although it tends to get crushed and broken up before that time. Glass containers can cause serious injury to those unfortunate to step on broken pieces; an average of 703 accidents per year involving packaging were reported to the Accident Compensation Commission between 1982 and 1984, of which 69 per cent involved bottles or glass, and we got some very lurid submissions in the packaging study of people who'd almost had their feet cut in half by stepping on glass in the surf.

Overseas experience indicates that marine litter is derived from a variety of sources, including coastal landfill, recreational beaches and recreational and commercial shipping. Research indicates that marine litter generated by shipping is particularly significant overseas. Other research indicates that at least a significant amount of New Zealand litter comes from fishing boats, in the form of plastic strapping and empty bait boxes.

Substantial amounts of consumer packaging such as detergent bottles, beverage cans and yokes, and bags can also be expected to originate from shipping as they dump their garbage overboard.

At least for some plastics, the concern that they're persisting in the marine environment may be overemphasised. British research in 1981 estimated that of over 2000 containers collected on North Sea beaches, 62% were less than two years old, and 85% less than 4 years old. They also found that a high proportion of older plastic containers and of those collected higher on the beach or behind the beach were fragmented. They concluded that some plastics, especially those made of high density polyethelene, are photodegradable out of water and that fragmentation occurs within about two years of exposure to sun. So we could argue that a biodegradable law or other mandatory requirement is not necessary. But in the short term at least, these plastics are ugly. The question is how much are we willing to pay to reduce this ugliness? There is a need to have some indication of how much of a problem the public perceives litter to be, and if it is considered a major concern, we need to look at cost-effective ways of minimising it.

Considerable emphasis is given by the media and public as to the hazard to wildlife that plastic packaging represents. However, although there have been a few well documented and publicised deaths to individuals caused by plastics in New Zealand waters there has been no evidence that plastic packaging threatens the wellbeing of a species or marine ecosystem.

There may however be grounds for some form of intervention to avoid distress to individual organisms. To support such a move, some form of risk assessment would be useful in order to best allocate resources. What for instance is the probability of a turtle drowning in a fishing net, as opposed to ingesting or being fouled by plastic packaging? Possible solutions to resolve these issues include:
1. the banning or restricted use of hazardous media;
2. the introduction of mandatory deposits;
3. the encouragement of recycling or reuse of packaging;
4. public awareness and education.

1. One possible solution is to ban or restrict particular hazardous packaging media so that they do not enter the environment. The MFE team commissioned Tong & Associates to evaluate the differential impacts of different packaging types on the environment. Unfortunately for a simplistic answer, their conclusion last year was that "it is not possible to produce accurate numbers on environmental impacts of different packaging materials. Evaluation is possible for individual packages, however the number of different packages on the market is so large and they change so fast that there is no point in doing a detailed analysis of each, and if it were done it would be out of date within a year".

This has implications for plastics in the marine environment, indicating that there is no basis for banning or restricting particular materials, such as plastics, on environmental grounds. For example a plastic compensates for its high energy consumption per tonne by making possible packaging which contains very little material, reducing both manufacturing energy per unit contents, and transportation energy. A plastic beverage container weighs only a fraction of a recyclable glass bottle of the same volume. So there's all sorts of energy equations, and unfortunately they're almost impossible to solve. Research has been done for some examples overseas, but the information is in most cases not particularly transferable to the New Zealand situation.

Plastics are considered to be hazardous to wildlife in the marine environment as well as being visually offensive. However glass containers on beaches present considerable health hazards to humans, exacerbated by the fact that their inconspicuous nature means that they are not observed until too late!

There may however be grounds for specific bans, or restricted use or adaptions.

2. Many submissions supported the use of bio- or photo-degradable plastic packaging. The technology is available to make degradable plastics, eg Ecolyte, however this makes plastic marginally more expensive. The packaging team consider that this would be useful for reducing the litter problem but not for reducing landfill problems.

Arguments can be made both for and against degradable plastics for litter control. Proponents argue that discarded litter would quickly decompose in the environment. A counter argument is made that people, knowing that the plastic is degradable, would discard plastics into the environment at an increased rate, thinking that they were not contributing to a problem, much as people throw apple cores out of their car windows, resulting in even greater plastic litter quantities than at present. Actual responses can only be guessed at.

There is some evidence that some plastics degrade within two years in the environment. However it does not solve the short term ugliness problem, nor the risk of entanglement to wildlife within this time.

Degradable plastics could also compromise plastics recycling which requires plastic of known integrity, however this aspect has not yet been explored.

3. We believe the introduction of mandatory deposits would lead to some equity problems for the manufacturers of packaging, and we're not convinced it would achieve its desired outcome. There's a lot of conflicting evidence from overseas examples of the introduction of mandatory deposits. However we do acknowledge that it has a role to play in litter control. At the same time there's a high cost involved and it's a matter of society deciding whether it wants to put up with the costs in the interests of litter control management.

4. Recycling of plastic packaging is one way of reducing the total amount of plastics needing to be disposed of. It already occurs to a significant degree at the manufacturing stage, where the composition and quality of the recycled material is known. Recycling of consumer plastics is occurring on a small scale, such as that operated by Otaki Recyclers. Wellington City Council has initiated a recycling scheme, and other schemes are being considered by entrepreneurs.

The question which needs to be answered is whether or not such schemes are likely to reduce littering of plastics? Existing schemes rely heavily on the goodwill and effort of members of the public for their success; one can query whether those who litter at present are likely to participate in such schemes.

5. Encouraging people to adopt a caring attitude towards the environment through public education and awareness raising has probably got the most going for it in terms of reducing the environmental impacts of packaging. Final users of retail packaging are dispersed throughout the country: 3.3 million people in 1.1 million households, and it is impossible for an authority charged with waste management or litter control to control and comprehensively police disposal at so many waste generation sites. There is far more chance of getting something done by persuading people to be environmentally aware and caring. We're also looking at how the Keep New Zealand Beautiful campaign can have more involvement with regional government.

6. One of the common submissions we received pointed to the need to tighten up the Litter Act. Keep New Zealand Beautiful has informed us that is going to happen in legislation later this year. Fines for littering are to be revised to be on par with crimes of similar seriousness. Hopefully new laws will encourage regional authorities to actually enforce the powers that are available to them. The Litter Act already has a lot of power, and I understand DOC officers are acting as Litter Control Officers. Central and local government and environmental groups can also play a role in advising people how they can go about their daily lives in an environmentally sensitive manner. The latter for example, are currently mounting a campaign to boycott the use of aerosols containing CFCs which harm the ozone layer. Already two supermarket chains are actively promoting alternative aerosols and are not selling offending goods.

There is a paucity of information regarding the nature of marine littering problems in New Zealand. In order to make any policy recommendations that have any chance of actually achieving their goals, policy makers need a number of questions answered. These questions include:
What is the composition of marine litter? Who generates it?
Is it really a problem (eg relative risk assessment?)
Is the public prepared to financially support litter clean ups? Are there specific packaging types which should be banned?

THE PRACTICAL EFFECTS OF NEW DOMESTIC LEGISLATION ON CONTROLLING PLASTICS POLLUTION OF NEW ZEALAND SEAS

Geoff Mooney
Ministry of Transport

The MARPOL convention of 1954 deals with oil pollution, and this was ratified by New Zealand after the introduction of the Oil Pollution Act. The MARPOL annexes dealing with other forms of pollution were introduced in 1973-78, and in 1979/80 we started rewriting our Pollution Act to incorporate these annexes. This went into abeyance, but we have now been instructed to have something ready by Easter 1990.

The problem in ratifying this international convention is that we have to have our own legislation in place first. To introduce sensible legislation we have to be able to comply with it and enforce it. For example, if you make a law saying you shall not dump plastics at sea, then you've got to make some provision at our ports where boats can dispose of all the refuse they've been storing up for weeks or months. Then you have the problem of disease if it is a foreign vessel. The rubbish must be brought ashore safely in bags and incinerated, so we have to have incinerators that can cope with all the garbage coming off ships at all the major ports and all the fishing ports - and this is one of the problems we have to face with the introduction of Annex V. We also need to provide rubbish disposal points at places frequented by boaties, as pleasure boats are also subject to Annex V. Education is a must to persuade boaties to keep their rubbish on board until they reach land and a disposal container.

It is easy to introduce the legislation, but policing it and making it work is the problem. It's very difficult to police the dumping of rubbish at sea. Even though the evidence washes up on the beaches, it's very difficult to tie it to a particular vessel. Legislation alone won't stop the dumping. It requires a long term educational programme to be continously applied.

Plastic debris collected from the Makara coast near Wellington.