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ENVIRONMENTAL GUIDELINES FOR THE CONSTRUCTION OF BOAT CHANNELS ON CORAL REEFS



Information Circular prepared for
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in The South Pacific

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INTRODUCTION

Since the 1930s about 200 boat channels have been built around the Pacific without any information on how blasting might affect:

- Food stocks of fish and other marine animals
- Stability of the reef and islands, particularly during storms
- Outbreaks of ciguatera fish poisoning (which are said to accompany forms of human disturbance).

In 1988 The New Zealand Ministry of External Relations and Trade commissioned ecologists at the University of Auckland to carry out an Ecological Impact Assessment on the effects of constructing boat channels by blasting on Pacific Atolls.

The assessment consisted of two main parts. Firstly, the ecologists sampled numbers of marine animals including fishes, corals, algae, snails and crabs on the reef and tidal area of one island (Niutao, Tuvalu) before, during and up to one year after channels were built. These numbers were also compared with undisturbed areas on the same island. Secondly, they examined a small number of additional channels and undamaged areas of other islands in Tuvalu (channels

up to 47 years old). Any long term changes in numbers of animals and algae were checked.

During each part of the work, the numbers of cells of *Gambierdiscus toxicus* (a kind of alga which causes ciguatera fish poisoning) and the amount of ciguatera poison in fish was measured around channels and compared with controls.

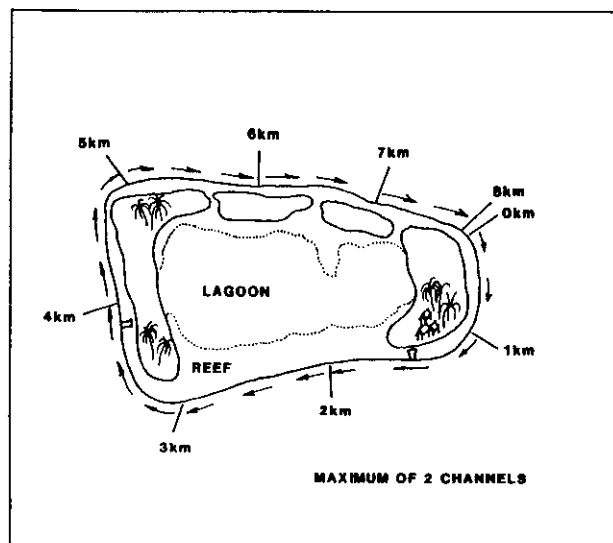
Results

The results obtained in the assessment showed that building channels did not have a big effect on the numbers of 83% of the 229 animals (e.g. fish), algae and sediments. In about 9% of cases, the number of animals declined, while in 7% of cases they showed an increase. The general conclusion was that provided certain limits were placed on how, where and when channels were built, they would not cause widespread damage to the reef communities. Recommendations were made to minimize impact and perhaps even increase the numbers of some animals (fish) in channels. Both old and new channels could be improved by following these guidelines.

GUIDELINES

The following guidelines were designed to minimize damage to reefs and protect fishing from effects of boat channel construction. In some cases the suggestions may lead to an increase in fish stocks in and near channels. The guidelines are based on information collected during the assessment described in the introduction.

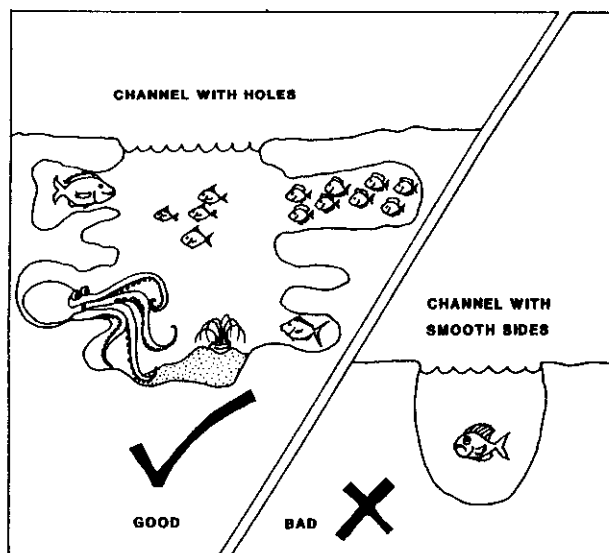
1. Limit the number of channels built on any island.



We suggest that a maximum of not more than 1 channel per 3 kilometres of oceanic shoreline on an atoll. This is only an average and the channels could be spaced as necessary. For example, an island with

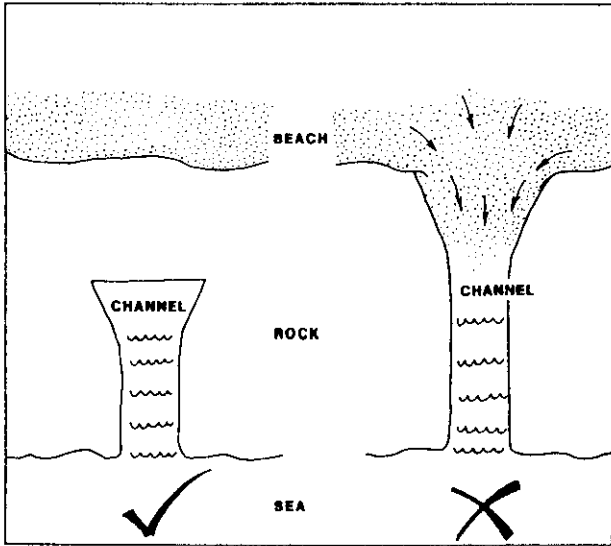
a circumference of 8km should only allow 2 channels to be built.

2. Build channels so that their walls and floors are complex.



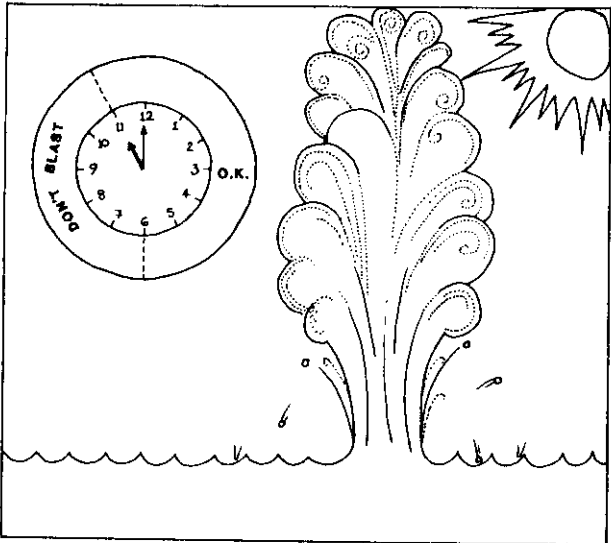
This means that channels should have several different types of materials on their floors (rock, boulders, rubble and sand) and holes and overhangs in their walls. As a general guide, channels with rocky and boulder floors will tend to attract surgeonfish and those with sandy and rubble floors will favour wrasses and goatfish. Complex walls and a deep channel mouth which slopes out to sea seems to encourage larger and schooling fish like mullet and drummers.

3. Minimize the size of channels and keep them away from the beach.



Channels should be of a size which is useful without being unnecessarily large. Keeping their ends well away from the beach (at least 10 m) will help ensure they do not drain the sand away.

4. Minimize the damage to fish.

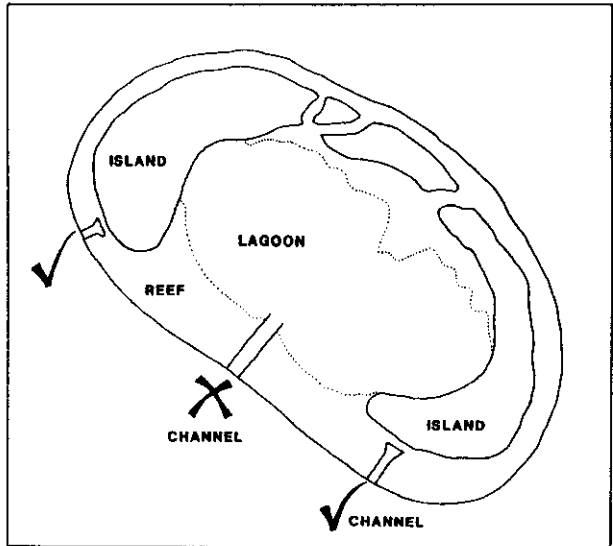


This can be done by either blasting only after 11 am on any day or by setting a small initial blast to frighten fish.

5. Avoid building or enlarging channels which connect with lagoons.

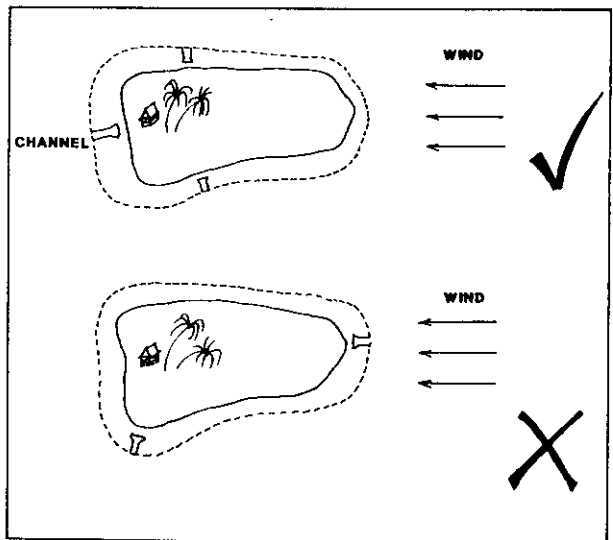
Tidal currents running through these types of channels can move large amounts of sand and can kill communities of animals and algae in the lagoon as well as on the outer reef at the channel mouth.

6. Never build a channel connecting a ponding lagoon with the ocean.



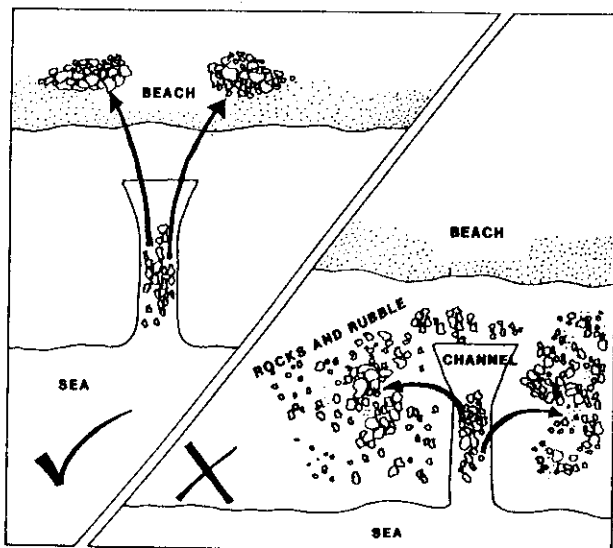
A ponding lagoon is one in which the water level at low tide is higher than sea level. If the walls of this kind of lagoon are opened by a channel, the level of water inside will drop during low tide killing corals (and other animals, including fish). Tidal currents in these channels reduce the amount of time during which the channel is useful.

7. Build channels on protected side of islands, avoid points around the reef, use areas which have already been damaged in other ways.



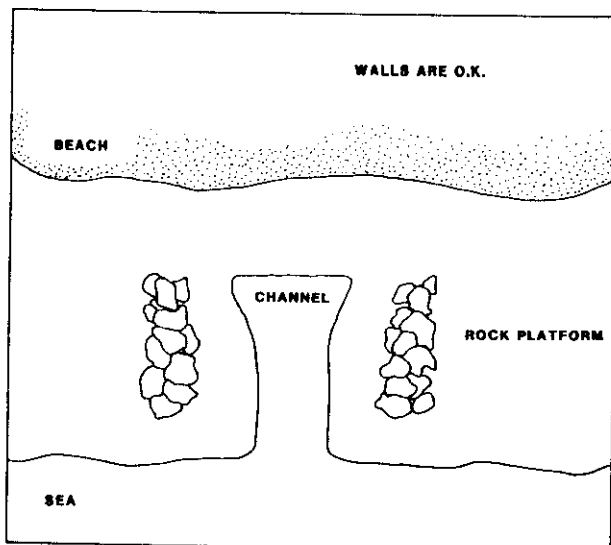
This limits channels to areas of lower productivity, lower exposure to storms (which could cause more damage in areas affected by blasting) and minimizes the total area of damaged reef on an island. Building channels on the highest area of the rock platform minimizes runoff into channels from nearby. Look for an area that dries out or is the most shallow during low tide.

8. Do not spread spoil from blasting over a wide area of the tidal rock platform.



This practice unnecessarily disrupts the ecology of the tidal platform, which is an important source of food for some fish during high tides. It could also make the reef more likely to have an outbreak of ciguatera by disturbing established communities of algae.

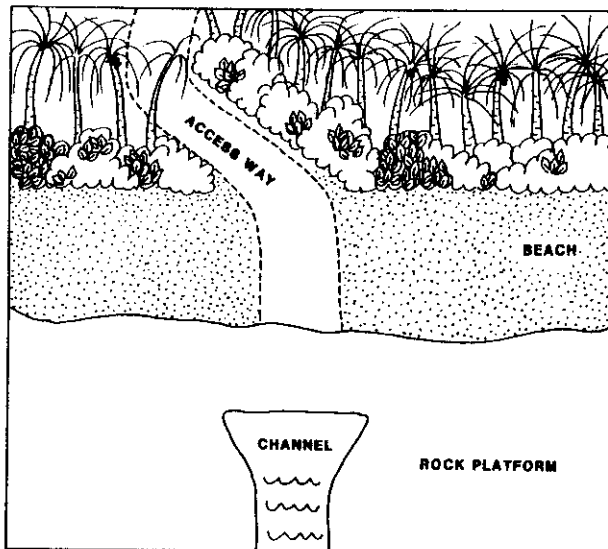
9. Channels may have boulder linings (though this is not required).



A wall of boulders (low enough to be covered by water at high tide) running either side of a channel provides shelter which increases the number of species of animals. Rock walls may also reduce some of the water flow into channels from the rock platform. They should have gaps in them if the channel is long.

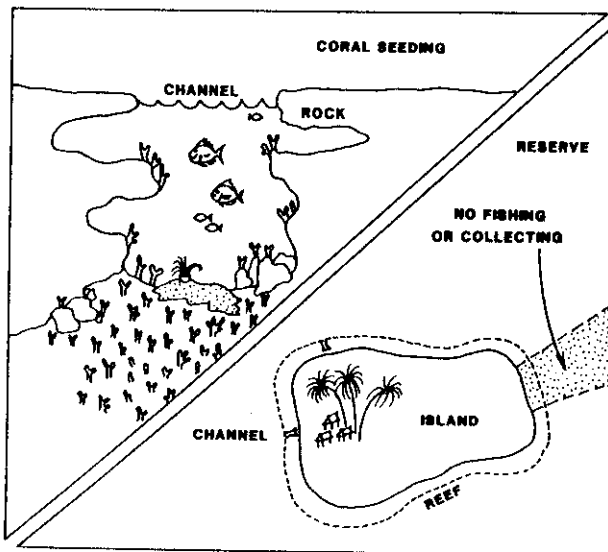
10. Stabilize the upper beach near channels.

The access road from the village should be angled away from the channel. The sides of this road way and top of the beach should be well-planted with coconuts and low bushes for 20-50m on either side of the channel to stabilize the area where people use the beach the most. (Picture top next column.)



11. Extra comments.

*** Coral seeding.**



The newly blasted channel and surrounds could be "replanted" with coral pieces to encourage natural populations of corals, fish and algae. This could be done by collecting 5 cm fragments of living coral from the surrounding reef and scattering them over the damaged area in long spells of calm weather. These fragments must be kept covered by seawater at all times if they are to survive being moved. Coral seeding may help to restabilize the blasted area and reduce the possibility of an outbreak of ciguatera.

*** Reserves.**

A small section of the reef on each island could be set aside as a permanent reserve to compensate for the loss of a section to channels. No fishing, collecting or other human damage should be allowed in the reserve; its purpose would be to ensure the continued supply of young animals to other areas of reef. This would be best done somewhere on the windward side of an island and would need to include the tidal platform and subtidal reef for at least a couple of hundred metres along the shore.

The information in this pamphlet is condensed from: The construction of boat channels across coral reefs: An assessment of ecological impact (Report 4, Final) by U.L. Kaly and G.P. Jones of The University of Auckland. June 1990. The full report is available from NZ Ministry of External Relations and Trade, Private Bag, Wellington, New Zealand.