Marine Policy 61 (2015) 39–45

Contents lists available at ScienceDirect

Marine Policy

journal homepage: www.elsevier.com/locate/marpol

Flexibility in temporary fisheries closure legislation is required to maximise success

Gaya Gnanalingam *, Chris Hepburn

Department of Marine Science, University of Otago, PO Box 56, Dunedin 9054, New Zealand

ARTICLE INFO

Article history:
Received 19 December 2014
Received in revised form
30 June 2015
Accepted 30 June 2015

Keywords:
Temporary closure
Fisheries management
Marine protected area
Indigenous rights
New Zealand

ABSTRACT

Temporary closures have been used for centuries in many parts of the world as a tool for fisheries management and restoration. The length of time that a closure is in place can play a determinative role in the effectiveness of the closure as a means of restoring stock biomass and diversity. For species that are slow growing and slow to reproduce, closures shorter than a decade are unlikely to be sufficient for the effects of restoration to accrue. New Zealand has two legislative mechanisms specifically designed to establish temporary closures: sections 186A and 186B of the Fisheries Act 1996. These provisions were created to respond to localised depletion and to provide for the use and management practices of Māori (New Zealand's Indigenous People). There is currently a two-year time limit on temporary closures applied for by the community. By defining a time limit for temporary closures legislators have failed to account for the ecology of many of the species targeted for protection that require longer periods of protection for restoration. Furthermore, the way in which the final decision making power is vested with central government is also inconsistent with the original purpose of the provisions. An amendment to the temporary closure provisions is suggested to provide greater flexibility for users and to better recognise the non-commercial fishing rights provided for by the Fisheries Act 1996, of local communities seeking to apply this tool.

1. Introduction

Many fishing nations employ a suite of fisheries tools to regulate and manage their marine environment. In recent times, conventional fishing effort and catch management controls such as gear restrictions, bag limits, and catch quotas have been increasingly paired with spatial management tools such as marine protected areas (MPAs), rotational harvest schemes or territorial user rights [1–3]. New Zealand, a country with the world's fourth largest exclusive economic zone is no exception, possessing a suite of legislative tools for the use, management, and protection of the marine environment [4]. One tool of fairly recent legal construction in New Zealand, is temporary closures: two-year area closures for the management and restoration of marine species. This paper examines the use of temporary closures as a mechanism for fisheries management and in particular how fit-for-purpose temporary closures are in relation to the length of time required for different species/stocks to recover. An examination of temporary closures in New Zealand where current legislation prescribes the length of time that closures may be in force is also provided. We question the utility of setting time limits within legislation for fisheries closures due to differences in the ecology of species targeted for protection and offer some recommendations for improving the flexibility of the tool, as it currently exists.

The terminology around temporary closures is varied and a distinction must be drawn between closures that are non-permanent and that are applied for a set period of time (a temporary closure), or on a rotational basis (rotational closure), and closures that allow for short harvesting periods but remain otherwise closed (periodic harvesting). This paper does not address the latter, though there are likely to be some similarities.

1.1. Temporary closures globally

Temporary fisheries closures, ranging in length from several weeks to several years have a long history of use: from 10th Century Arab fishermen who used nine-year closures for the fishing of coral [5] to the legislated temporary bed closures for geoduck in British Columbia [6]. Many indigenous communities across the Indo-Pacific have used, and continue to use, temporary closures and they are known by a variety of names including *sasi*

* Correspondence to: Department of Biological Sciences, Old Dominion University, Norfolk, VA 23529-0266, USA.
E-mail addresses: ggnan001@odu.edu (G. Gnanalingam), chris.hepburn@otago.ac.nz (C. Hepburn).

http://dx.doi.org/10.1016/j.marpol.2015.06.033
0308-597X/

laut in Indonesia, *tabu* in Fiji, *tambu* in Papua New Guinea, *tokoro* in the western Solomon Islands and *raui* in the Cook Islands [6–10]. They are considered an important primary tool for many community based and co-managed areas [11]. In the Indo-Pacific these closures have been, and are used, for a number of reasons: as a mark of respect for the death of prominent community members, to protect sacred sites, to assert control or access to fishing grounds, or for the replenishment of stocks [12,8]. In some instances these closures have been given legislative support. In Vanuatu for example, government supported village based marine closures have been implemented expressly for the sustainable management of the mollusc *Trochus niloticus* [13,14].

As with other fisheries management tools the goals for temporary closures are simple: a reduction in fishing mortality and an increase in species size and stock abundance. Contrasted with permanent no-take MPAs however, temporary closures also aim to decrease administrative costs, reduce enforcement, and simplify logistics, while ensuring that community links to marine resources are maintained [15,13]. This latter point – the maintenance of a community's link to its marine resources – is not a minor one. Indeed for some, it is the main reason they oppose no-take permanent MPAs, which they view as preservationist and serving only to 'lock up' a resource [16].

1.2. Time to recovery

There has been minimal empirical research on the effectiveness of temporary closures as a means to increase biodiversity and biomass. As such, there is little guidance available in the literature on appropriate recovery times for temporary closures. Guidance may however be gleaned from the significant body of publications on no-take marine MPAs that is presently available.

In current literature, there is considerable evidence that permanent no-take areas provide a number of fisheries benefits including increased abundance, biomass, spill-over into unprotected areas, larval exchange and egg production [17–20]. Provided there is a decrease in fishing related mortality, the length of time required for such benefits to be observed varies according to a number of factors, including the baseline biomass and life history of the species targeted for protection, recruitment dynamics, the size of the area protected, the extent of the fishing pressure in adjacent areas, and the level of enforcement of the closure [21–24]. Studies that document continued declines following closures ascribe the decline to uncontrollable stressors such as hurricanes, disease, high temperatures and/or intensive unregulated fishing [25,22] and in these cases, closure time is likely to be of little consequence.

Closures of less than one year are unlikely to be practical and for most species of invertebrates and fish, closures of this length are unlikely to yield any positive effects on biomass [26]. Short closures of between two and four years however have been shown to be promising for a number of marine species [27,28]. Typically these species are relatively sedentary, with short lived or demersal larvae, high growth relative to natural mortality, and steady recruitment [29,9]. Examples include Atlantic scallops [30], red sea urchins [21,31] and *Anadara* sp. in Fiji [11]. In the US Atlantic scallop fishery the biomass of stocks in closed areas nearly quadrupled between 1994 and 1996 and increased nine-fold between 1994 and 1998 [32]. Even within fish communities the effects of closure have frequently been detected within five years (in some cases even 1–3) after the establishment of protected areas [33–35]. If the species is long lived with greater mobility and/or variable recruitment however longer time periods, up to several decades in some instances, may be required before a response may be detected [36]. Periods of up to 50 years have been suggested for the recovery of some Pacific coral fisheries [37] and areas closed in 1994 on the Georges Bank in part for the restoration of the Atlantic cod fishery have yielded mixed results [2]. It is important to recognise, that though closures are presumed to increase biomass and biodiversity not all species respond positively to protection [36]. Non-commercial, unexploited bentho-pelagic species for example had lower abundances following the cessation of fishing in reserves due to increased competition and an increase in predators [36,38].

As with permanent no-take closures, the success or failure of a temporary closure is likely to be contingent on a number of factors additional to the length of the closure. For temporary closures in particular however, the intensity of harvest on reopening can have a significant effect on the potential of temporary closures as a tool for restoration and management [39,40]. There have been several reported cases where fisheries benefits gained from temporary protection (increased fish size, abundance, spillover potential) were rapidly removed when protections ceased [26,41–43]. In Fiji a single intensive harvest quickly removed almost all the positive effects a customary managed closure in force for three years had on fish biomass and subsequent reproductive output [20]. One year after harvest, total fish biomass had still not recovered and the biomass of piscivores was nearly exhausted [20]. Long term ecological studies and meta analyses suggest closures must be no take and permanent to achieve sustained fisheries benefits [44,19,45]; however temporary closures can be used successfully if partnered with other tools that limit over zealous harvesting on reopening such as harvest quotas with limited entry permits or licenses – as is the case in the US Atlantic sea scallop fishery on Georges Bank [32].

2. Temporary closures in New Zealand

2.1. Fisheries management in New Zealand

Prior to the European colonisation of New Zealand, fisheries were the communal property of indigenous tribes living on the coasts [46]. Marine resources were harvested and managed within a clearly defined rohe (territory) belonging to specific iwi (tribes) or hapū (sub-tribes) [47,48]. With European colonisation and the signing of the Treaty of Waitangi (the Treaty) in 1840 between the British Crown and over 500 Māori chiefs however, there was a fundamental shift in the governance and regulation of all natural resources including fisheries in New Zealand [49].

Article 2 of both English and Māori language versions of the Treaty guaranteed "full exclusive and undisturbed possession of … fisheries…" to iwi. Over the next 150 years though, iwi fisheries rights were eroded to the point where iwi had limited involvement in the management of many fisheries [48]. A centralised approach to fisheries management had emerged instead – one that favoured open entry regulated by input and output controls [50]. By the 1980s with the increasing overcapitalization of fisheries and the depletion of inshore stocks, an overhaul of the existing legislative regime was called for. What resulted was the introduction, in 1983, of a nationally applied, centrally managed, Quota Management System (QMS) – a rights based individual transferable quota (ITQ) system, for commercially harvested fish stocks [48].

The legislation that created the QMS, the Fisheries Act 1983 and its successor the Fisheries Amendment Act 1986 which gave effect to the ITQ system, failed to address iwi claims to national fisheries. Consequently, as fisheries were partitioned under the new scheme, iwi fishing claims came to the fore. As an interim measure the Māori Fisheries Act 1989 was enacted to increase Māori involvement in fisheries management but it was not until 1992 that 'full and final settlement' of all iwi fishing claims was reached with the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992