

Towards a community GIS for the Bluff Oyster Fishery

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1.0 INTRODUCTION

The Bluff Oyster Fishery is one of the oldest and most important fisheries in New Zealand (from a cultural if not purely economic point of view). Much scientific research and thought / discussion on management has occurred on the subject of this valuable resource. GIS approaches have been used for a number of years in analysis of oyster population and distribution, and this information has been made available to participants in the industry (pers. comm., J. Cranfield, NIWA). We propose to use GIS as a communication tool in the social and political context of the fishery. Good science is one component of resource management, as well as equitable sharing of wealth, and the latter age questions of restraint in the face of ecological crisis.

Earlier research has identified at least two distinct socio-economic groupings associated with the fishery—the owners and the fishermen (these terms are used within the context and definition of terms found in Knight, 2003). The same research highlighted the dispossession of the fishermen as a result of the introduction of the Quota Management System and the breakdown of inclusive management of the fishery. With no formal or legal say in the fishery the participation of the Bluff oyster fishermen has been limited to speaking out in the media and in petitioning the Minister of Fisheries. Information is one key to widening the influence of the Bluff fishermen; popular struggle depends on dissemination of views, and GIS has the potential to be able to present a complex physical situation (the state of the fishery) in an accessible way.

2.0 FISHERIES AND PUBLIC PARTICIPATION GIS

Worldwide there is a common scenario of fish stocks being overharvested (e.g. Macnab, 2002; Mehic et al, 2003), a problem that occurs in the spatial and temporal domain. In fact, over-fishing is only a part of what is amiss with today's fisheries, other cited reasons including poor environmental management and lack of knowledge (Meaden, 2002). The application of technology, specifically GIS and the Internet, is seen as a key tool in solving some of these problems, making for effective fisheries management. The role of online GIS in particular is manifold, facilitating information dissemination to management authorities and increasing environmental awareness at the public level (Valavanis, 2002).

That last role is important in the context of the Bluff fisheries, as it is empowerment through information supply at the public level that is an aim in this case. As Naisbitt (1987 – cited in McGlamery 1995) says, “the new source of power is not money in the hands of a few, but information in the hands of many”.

Dangermond (1995) establishes the scenario within GIS: "...geographic data sharing with the public may be among the most important issues now before the GIS community". The role of GIS in a societal context and particularly public participation has since become a major research topic in the emergent Geographical Information Science, being one of the foci for NCGIA's Initiative 19 (Pickles, 1999), and subsequently Project Varenius (Goodchild et al, 1999). The latter project has led research in a subset of GIS known as Public Participation GIS (PPGIS), extensively reported on in Craig et al (2002).

In his foreword to that book, Goodchild (2002) emphasised the historical shift from exclusive and expensive GIS to a cheap, powerful version of the same, yet still not quite geared for ubiquitous, public level use. As well as the training required to operate a GIS (reflected in the Macnab [2002] case study), there are other societal considerations, such as the need for the implementation to be community led (Macnab, 2002) and the social (and technological) framework within which the GIS is accessed. For the latter, Leitner et al (2002) cited six models of PPGIS delivery, including Internet Map Servers, neighbourhood GIS centres and publicly accessible GIS facilities at universities and libraries (see also McGlamery, 1995). Associated issues include metadata provision (Moore [2001] reports on a web-based metadata access system for coastal zone managers at the community level), metadata and data standards, and the all-encompassing issue of interoperability (Vckovski, 1998).

The proposed research is clearly an example of this community-led GIS, in this case promoting the self-governance of indigenous resources. A similar initiative for the depleted fisheries of Newfoundland, Canada, was reported on by Macnab (2002). In this case there was also a marginalization of the knowledge and concerns of fishers by the powers-that-be. To attempt to rectify this, the use of GIS was proposed to capture this knowledge, with mixed results. The main problem was the time taken to educate the fishermen how to use the GIS – a lo-tech alternative was proposed, where knowledge capture was effected through drawing fishing areas on paper charts (digitisation via GIS would come later in the process). This is exactly the approach described by Nietschmann (1995) and used to protect endangered reefs (Miskito) off Nicaragua.

3.0 HOW CAN WE HELP?

The situation in Bluff is both a social and environmental issue, encompassing the town, a population, an industry—a unique region of seafloor (geography); a unique and fragile ecosystem, though highly modified.

Having briefly reviewed the relevant literature, it can be seen that the Bluff scenario lends itself to a contribution from a community-led GIS for the following reasons:

1. The need for a virtual model because of the lack of means of seeing the seafloor directly—a model may provide a means of communicating, a means of establishing baseline understandings in a situation where different groups are presently exhibiting a lack of discussion. A model of the seafloor would include description of the pertinent ecosystems and their modification through time.
2. A means of interpreting; cataloguing; simplifying and presenting more than 100 years of spatial science relating to oyster population and distribution. It is intended that this integration of data will juxtapose current conservation-minded and exploitation-minded viewpoints on the matter. Valavanis (2002) flags GIS integration as a way of identifying conflicts between management policies and "marine objects dynamics". Therefore, attention must be given to fisheries management and fisheries science at the national (government) level, including the property rights policies and current operational structures of the Ministry of Fisheries.
3. The need for organized spatial information in current management—in the move from a wild fishery to a farmed fishery, management concerns location of oysters, distribution of fishing effort, and the need to quantify the oyster population temporally and spatially.

4. Most importantly, the need to free up information; to make information readily available and accessible by the public in order to help empower those dispossessed of their management role by the 'capture' of the fishery by private capital.

This paper will discuss the options available as regards a PPGIS for the Bluff fishers.

REFERENCES

- Craig, W J, Harris, T M and Weiner, D. (eds.) (2002). Community participation and geographic information systems. London: Taylor and Francis.
- Dangermond, J. (1995). Public Data Access: Another Side of GIS Data Sharing. In: H J Onsrud, and G Rushton (eds.) *Sharing Geographical Information*. New Brunswick, New Jersey: Center for Urban Policy Research, p 331-339.
- Goodchild, M, Egenhofer, M, Kemp, K, Mark, D and Sheppard, E. (1999). Introduction to the Varenus project. *International Journal of Geographical Information Science*, 13, 8, 731-745.
- Goodchild, M. (2002). Foreword. In: W J Craig, T M Harris and D Weiner (eds), *Community participation and geographic information systems*. London: Taylor and Francis.
- Knight, P. (2003). *Bluff Oyster Fishery – Management in Review*.
- Leitner, H, McMaster, R B, Elwood, S, McMaster, S and Sheppard, E. (2002). Models for making GIS available to community organizations: dimensions of difference and appropriateness. In: W J Craig, T M Harris and D Weiner (eds), *Community participation and geographic information systems*. London: Taylor and Francis, p. 37-52.
- Macnab, P. (2002). There must be a catch: participatory GIS in a Newfoundland fishing community. In: W J Craig, T M Harris and D Weiner (eds), *Community participation and geographic information systems*. London: Taylor and Francis, p. 173 – 191.
- Meaden, G. (2002). Foreword. In: V Valavanis, *Geographic Information Systems in Oceanography and Fisheries*. London: Taylor and Francis.
- McGlamery, P. (1995). Libraries as Institutions for Sharing. In: H J Onsrud, and G Rushton (eds.) *Sharing Geographical Information*. New Brunswick, New Jersey: Center for Urban Policy Research, p 319-330.
- Mehic, N, Ross, T, Al-A'Ali, M, Bakiri, G. (2003). A GIS for Bahrain Fisheries Management. In: *Proceedings of the 1996 ESRI Users Conference*. Accessed 20th November 2003.
<<http://gis.esri.com/library/userconf/proc96/TO250/PAP240/P240.HTM>>
- Moore, A B. (2001). An Internet-Based System for Coastal Metadata Provision. In: *Proceedings of the GIS Research UK 9th Annual Conference: GISRUUK 2001*, 3-6. University of Glamorgan: UK.
- Naisbitt, J. (1987). *Megatrends 2000: ten new directions for the 1990s*. New York: Morrow.
- Nietschmann, B. (1995). Defending the Miskito Reefs with Maps and GPS – mapping with sail, scuba and satellite. *Cultural Survival Quarterly*, Winter 1995, 34-37.
- Pickles, J. (1999). Arguments, debates, and dialogues: the GIS-social theory debate and the concern for alternatives. In: P Longley, M Goodchild, D Maguire and D Rhind (eds), *Geographic Information Systems*, New York: John Wiley, vol. 1, pp.49-60.

Valavanis, V. (2002). *Geographic Information Systems in Oceanography and Fisheries*. London: Taylor and Francis.

Vckovski, A. (1998). *Interoperable and Distributed Processing in GIS*. London: Taylor and Francis.