

The Marine Resource: Administration Infrastructure Requirements

Bill Robertson

Land Administration Consultant

Professor George Benwell

Academic Director of Research
University of Otago,
New Zealand

Professor Chris Hoogsteden

Department of Surveying
University of Otago,
New Zealand

**Presented at the UN-FIG Conference on Land Tenure and Cadastral
Infrastructures for Sustainable Development, Melbourne, Australia
24-27 October 1999**

ABSTRACT

As discussed in our previous paper the United Nations Convention of the Law of the Sea (UNCLOS) provides a protocol for claiming new territorial areas extending over a nation's adjacent continental shelf. This raises a wide range of new governance issues for the future. In the case of New Zealand a deadline of August 2006 adds an urgency to both identifying the extent of these new territorial areas and for preparing for the administration of this new ocean territory. Understandably the advancing deadline has led to a preoccupation with the definition of the boundaries of the new sea and ocean area. However, early attention is also needed regarding the planning of the administrative infrastructure to enable NZ to effectively govern extensive ocean areas amounting to more than 20 times the land area of New Zealand. Not only do nations need to demonstrate responsibility in defining these new areas but it is desirable that they demonstrate a capability and an intent to administer these new areas in the terms of sustainable development obligations. Responsibilities arise from the national constitutional and legal framework and from existing international conventions.

The opportunities are immense as the vast resources and space added as sovereign territory become available for national use and development. However, there are also major challenges to the nations involved and to the community of the United Nations. The concept of administering such large maritime areas is new and there are no traditional overarching models of marine territory administration to follow. In addition the capability to achieve effective administration will be influenced strongly by the maritime environment, character and conditions. The land and sea components have major influences on the processes and characteristics of each other's environment. This is particularly so at the interface of the shoreline and the coastal zone. Thus, strong interrelationships and co-ordination is indicated but the form of this commonality needs careful consideration and planning. These will impose major adaptation and innovation in relation to the application of comparable land based systems.

Existing land administration systems, practices and infrastructures offer relevant learning but they will need significant modification to accommodate marine circumstances and to enable integrated administration of an integrated land and sea interface. An imperative is to relate with those land administration

practices which have proved effective on land and can be sufficiently adapted to serve an effective role in the offshore environment.

There are many single purpose and local systems designed for the administration or management of specific parts of the maritime area. These provide useful information and learning in the development of overarching spatial infrastructure elements for administering these extensive and highly dynamic new territorial areas.

It is in this challenging new context that our paper considers issues of governance related to marine resources management. We see one of the key governance requirements as the need to register, record and monitor, marine resource rights and responsibilities, and to contemplate the development of suitable marine cadastral and information systems infrastructure to serve the wide range of applications likely in the years ahead.

Keywords and phrases: sustainable development, marine resource

THE CURRENT CIRCUMSTANCES

In considering the implications of the addition of new maritime areas under New Zealand's sovereign jurisdiction it is useful to make some brief physical comparisons. Although New Zealand has a relatively small land mass it is part of a vast submarine continental shelf of plateaux, ridges and rises and sea floor that occupy our current exclusive economic zone. This varied submarine landscape parallels the variety of our land terrain but with higher peaks, than Mount Cook our highest mountain, and longer ridges than our alpine chain the Southern Alps.

Enormous national assets will accrue from this new area of New Zealand. These include hydrocarbons, minerals, fish and other biological resources and opportunities in less obvious areas such as information, communications and energy. Preliminary surveys of the ocean floor have already showed immense mineral resources with great opportunities for enhancing social and economic well-being. The related activities of commercial fishing, recreational fishing and leisure, science and research, transport, navigation etc. will all multiply the opportunities and benefits arising.

Currently an ad hoc approach to the authorisation of rights has been taken with allocations and spatial extent being defined in various ways by different agencies and industries. This has left a legacy of single purpose and isolated systems developed on an 'as required' basis to serve new commercial initiatives.

Some of the major initiatives have been in the fields of fishing, the coastal zone and recreation. Over the years there has been increasing recognition of the need for coastal zone planning. In New Zealand the coverage of planning authorities has now been extended well out from the mean sea level. However to date much of the emphasis has been on sea defences, protection against flooding and breaks, securing recreation areas and the general aspects of environmental protection. Although land use on shore may have a strong impact on quality of the adjacent sea much of the administrative effort has been more concerned about the land part than the sea part of the coastal zone. There has also been over recent years a major focus on managing fishing activity. Useful techniques and research has helped New Zealand develop a "leading edge" system for fish catch management termed the Individual Transferable Quota (ITQ). Conservation management has been developed in relation to the

establishment of maritime parks and reserves as for marine reserves. This has been of benefit to the rapidly growing tourist industry. Whale watching, swimming with dolphins and observing wildlife are already particularly successful ventures in New Zealand. Allocation and licensing systems have also been developed on a user needs basis for fish farming, hydrocarbon and mineral prospecting and extraction.

Traditional rights and involvement of the Maori people in New Zealand has been provided to some degree through the allocation of fish quotas and recognition of traditional fishing rights for Maori in terms of the Treaty of Waitangi.

Current jurisdictional systems and infrastructure are highly sectoral and each institution manages its own established mandates. For example the Ministry of Fisheries, The Ministry of Defence, The Maritime Safety Authority etc. have strictly defined functions and responsibilities and other themes, issues or responsibilities not prescribed are not treated for want of a responsible organisation. There is currently no central organisation with responsibility for the overall administration of the territorial sea and ensuring the administration is comprehensive and complete.

The New Zealand Government has approved a programme and funding of activity to properly identify and position the outer boundary of the continental shelf that it intends to claim. The funding approved is in the order of USD 25 million over the next six years. The availability of funds and the deadline for the New Zealand claim has emphasised the definition of the continental shelf as a priority over other administrative framework needs. However, it is essential that the infrastructure for the governance of this new territory is planned and developed from the outset. Delays will lead to the escalation of single purpose systems and non strategic management and use of the resources is likely to continue on an ad hoc basis. This new area of territorial ocean has been described as the 'next great economic frontier'. The key to its sustainable development is governance and the appropriate infrastructure. We must at all costs avoid this new territory starting off as a 'wild west frontier'.

It is of significance that the topic of New Zealand's oceans has been identified as a priority by the Centre for Advanced Engineering (CAE) at the University of Canterbury. The CAE launched a project in April entitled "Our Oceans: The Next Great Economic Frontier. A key event in this new project is a two-day conference to be held at Te Papa Tongarewa the Museum of New Zealand on 12th to 13th October 1999. This indicates the rising of interest in the New Zealand professional scene in the off shore area and issues arising from its use and management.

THE OPPORTUNITIES AHEAD

Immense untapped mineral wealth lies on and below the ocean floor. Our knowledge is continually growing about these resources. For example it was only in the late 1970s that hydro-thermal plumes (black smokers) emitted from undersea volcanoes were first discovered and more recently that their significance as sources of metal rich hot fluids from inside the earth's crust was recognised. While there are about 25 sites around the world where hydro-thermal mineral deposits are recorded on the ocean floor most of these are at depths of around 2.5km in mid ocean. The New Zealand vents occur mostly in less than 1.5km under water and come through

andesite and dacite rock. This undersea volcanic activity and associated mineral deposits continue up the Southern Kermadec ridge towards Tonga. The mineral assays already done show high percentages of zinc, copper and gold. These hydro-thermal plumes are also a main source of oceanic manganese and iron discharge into the sea waters around New Zealand and further out to sea.

The ownership of the new maritime territory in addition to the ownership of the fish already allocated through the authority bestowed through the Exclusive Economic Zone offers a further opportunity for improved marine resource management. Although the theory of fish stock management has been widely recognised, in practice the overall management performance for all fish species has been badly lacking. Effective research and measurement of fish stock by species has generally been inadequate to manage the total resource. Currently the ITQ system is lacking the research and monitoring support to enable it to become a prime resource management tool. In addition to this, habitat research to enable improved fish stock management is also largely absent endangering the capture of fish productivity increments and optimal total catch from the new territory over the long term.

MANAGING NEW CHALLENGES

Having briefly considered the opportunities that arise from the addition of continental maritime territory in general and to New Zealand in particular it is prudent to also consider the challenges and the complications that need to be addressed from the start. Many different players with vested interests in the ocean present a number of major difficulties. Activities are usually isolated and the research based knowledge of the long term sensitivity and fragility of the marine environment is currently lacking. In addition individual activities are frequently not well related to the environmental conditions nor well integrated with the administration or management of other activities. The prime mover in exploring, developing and managing New Zealand's offshore resources will remain the commercial sector. However the development of co-operation and a co-management approach is needed in the future to cope with the diverse marine resource requirements. New Zealand must foster administrative systems and environment that encourages the co-ordinated exploring, developing and extracting of resources, while at the same time facilitating management of these activities with sensitivity to the environment.

We have had a long period of resolving the integration of a wide range of uses and conservation issues and activity on land. At this point in our history we have legislation and policy and planning thinking that is in fully in accordance with the programme of sustainable development outlined in the United Nations Agenda 21. However, even at this mature stage of our terrestrial land use and planning there are valid criticisms of the techniques used to deliver and practise our integrated resource management. In contrast our maritime resource areas and conditions are even more challenging and dynamic and resource use and management costs and risks are a magnitude higher. The fluid and temporal nature of the sea water resource and its biota presents much greater difficulties of administration than on land. The ability to identify, plan for, monitor and limit environmental effects will demand new systems of resource administration and new concepts and systems of supporting administrative infrastructure. This will be essential in our maritime administration

even though our track record in comprehensive maritime management is short and sketchy. Our marine resource administrative infrastructure will need to cope with increasing pressures both globally and nationally for the better sustainable use of maritime resources. They will have to accommodate a growing pressure and need to supplement land resources to aid the improvement in the quality of life for existing and future populations.

Although the pioneering of the ITQ technique is very forward thinking, it's long term application depends on continued research and inventory knowledge of the stock of all the relevant fish species, and the characteristics of their habitat. The ITQ concept is currently very much a gamble in relation to what is the sustainable level of catch until comprehensive research and assessment data base, is provided to substantiate the validity of quota levels for all fish species allocated. The establishment and application of techniques for accurately and continually inventorying and managing fish stock and habitat is a new frontier of activity that will be demanding of resources and expertise. The accurate and regular monitoring of changes to the total stock through measurements of outputs from catch, 'movement out', or death, and 'movement in' through, re-supply, breeding and growth needs to be developed and universally applied.

In New Zealand the acquisition of vast new maritime territory has implications for the resource rights of Maori in terms of the Treaty of Waitangi. Current thinking on the internationalisation of indigenous rights to land, sea, natural resources, sustainable development and self determination can be applied from the start in as far as these are deemed to apply to the new territorial ocean areas. The recent development of Traditional Resource rights (TRR) sets out many bundles of rights that apply to the use of traditional knowledge and resources and can be applied here. This could provide the basis for developing a set of principles that guide the process for dialogue between indigenous people, commercial groups, NGOs and government. However, TRR is a conceptual approach yet to be operationalised as a practical and accepted technique.

A key challenge will be how to define and establish effective governance in an administrative infrastructure that is wider than current policy and management issues and provides an overarching framework in a very temporal and turbulent maritime environment. Defining the rights and responsibilities for the state, and managing the market and the public/commercial/private dynamics poses issues of a new order. As well issues of national security and policing the area all need attention and will all need to be included in the administrative agenda. Investment and capital needs and mechanisms for development will require property rights assurance if viable commercial strategies are to be established and maintained. Major changes can be expected for present traditions and institutions and reactions to these will require careful management. There will be a vast area to initially reconnoitre and prospect and to research and map. Comprehensive knowledge of the sea floor is crucial to NZs determination of the boundary of its new territorial area as well as to its subsequent administration and management of it.

As New Zealand and international commercial fishing capability continually becomes more and more efficient it will strive more and more to maximise the catch

and the sustainable value of the New Zealand seafood sector. The seafood industry has a challenge to change the way it thinks and operates to take full advantage of the resource potential. The produce from the NZ territorial sea has special quality characteristics because of the nature of the New Zealand ocean environment. Developing this reputation and the intellectual property involved will be particularly important. The sustainable harvesting of this resource requires a major change towards a focus on customers and high quality and a substantial further shift along the continuum of mining to husbandry.

There are a range of innovative technologies developing, aimed at assisting the NZ fishing industry to double the value of fish stock and triple its share of that value. These developments emphasise the need for a consistence frame of spatial reference that provides for confident positioning identification and wide geographic and spatial relationships in four dimensions.

There is already a large risk in marine activities and the full confidence and security of ownership or resource use rights is essential from the beginning to avoid adding to the high costs and risks involved in marine resource use and harvesting activities. The definition of the boundary of the continental shelf will precipitate the development of consistency of a unified datum for all land and sea areas of New Zealand. The datum currently being established for the New Zealand land area will be able to accommodate the seamless land and sea reference system promoted in our earlier paper. However, the availability of a spatial infrastructure capability throughout the new maritime territorial area will also be a prerequisite to the application of new technology and resource management techniques. Ownership and management requirements create special problems. Locational identification and referencing is an essential tool for resolving these issues. International and national rights obligations and relationships will require monitoring and reporting all dependent on an effective spatial information infrastructure for their efficacy. As there is no practical alternative for identification through effective bottom or sea monumentation in most instances the development of a consistent spatial reference and infrastructure needs conceptual development from the start.

There should be no expectation of an early bonanza in terms of marine resource yields because of the major challenges still ahead in surveying and understanding the ocean environment. To achieve the latent potential much more will have to be done in the years immediately ahead. These efforts will involve new skills and approaches, careful management of environmental issues, intelligent central planning, responsible sovereignty and far sighted investment. Except in a few areas we have only limited knowledge of the extent and characteristics of the resources. Some work is going on now, the sea bed is starting to be mapped and the fishing industry is active, but there is still much to be done. Investigating and developing the resources of our ocean zone will be technologically challenging because of the size of the area, and because most of the resource is not directly measurable or observable. Permanent climate shifts add further to the complexity increasing the difficulty of sustainable management of the resource.

The new frontier promises much but there is the unrelenting pressure of the elapsing time limit if New Zealand's potential rights to this area are not to be lost.

Significant new developments for the use of marine resources need to be anticipated to allow us to plan and research the potential opportunities in New Zealand's ocean area. Currently there is little understanding and appreciation of the scale of the additional new territorial area and resources either by the public or by the commercial sector and public support will need to be nurtured.

UNCLOS has stipulated demanding criteria for the acceptable definition of the boundary of the continental shelf. But the question needs to be asked what evidence should the UN be expecting of the governments claiming territorial ocean areas to demonstrate their capability to govern these areas in terms of UN requirements for sustainable management.

SUSTAINABLE DEVELOPMENT

Sustainable development has been defined in by the Report of the World Commission on Environment and Development, Our Common Future (The Brundtland Report) as development which meets the needs of present generations while not compromising the ability of future generations to also meet their needs. This report emphasised that environment and development are no longer separate issues and that they are interlocked and that if sustainability is to be achieved institutional reform will be required. The requirement for the integration of conservation and development is even more applicable in the maritime territory. The question for our spatial and geographic community is how can a marine spatial infrastructure be developed to effectively serve the diverse community of interest and responsibilities brought about by these new areas of new territorial ocean? The strong commitments to sustainable development made through Agenda 21 for our current territorial area should automatically extend to the new maritime territory on approval of the New Zealand claim. Further sustainable development protocols related to ocean area are also likely to be developed in the future and their implementation will require an effective jurisdiction and administration. For example the UNEP is developing strategies and protocols related to ocean conservation issues.

Fishing activities can move towards a far more sophisticated fish stock and fish food and habitat management regime. Technology will play a big part in this and consistent and accurate spatial reference will be an essential requirement. Already fishing applications involve radar, global positioning systems, remotes sensing, fish finding etc. Acoustic fish detection technology is currently being researched and applied and offers great prospects for future fish research and management. A wide range of characteristics of fish stocks need to be determined including age of fish stocks and their changing composition.

Fish mapping is a developing technique, useful as an adjunct to a wide range of other relevant documentation. Aligning intelligent map making with acoustic fish detection technology will optimise fishing operations. Positional referencing will also support a system of 'traceability' throughout the industry for both administrative and productive quality reasons. Appellation systems already provided for in the TRIPPS agreement of GATT can then be applied for the protection of the quality and recognition of the NZ fishing industry and its branded products.

The emphasis in UNCLOS has been on assuring the quality of the interpretation and definition of the boundaries of the new territorial sea. However, if the UN is to have confidence in the administration capacity of jurisdictions to meet their international obligations evidence of capacity for managing sustainable development of the marine resource will be desirable. In this respect it would be reasonable for jurisdictions making claims to provide evidence of their capability, current or planned, to provide sufficient governance, marine resource management and spatial integrity. A well conceived and articulated marine resource administrative infrastructure covering, governance, sustainable resource development planning and management, and a spatial information infrastructure would provide such assurance of jurisdictional responsibility.

SOME OPTIONS TO PREPARE FOR THE FUTURE

The long term potential for human use of the wide range of resources referred to previously requires the effective planning and the incremental initiation of a resource administration infrastructure that can develop in response to the user demands in what ever form they emerge in the future. This will mean the development of a conceptual vision linked to a skeletal framework capable of extension or intensification as new needs are identified or anticipated. Activities already being established in the potential area of territorial sea can be greatly increased and the marine resource values enhanced through the initiation of a reliable and efficient marine resource infrastructure.

The effective administration of a significant area of new marine territory requires early planning and preparation. The rights and responsibilities are new, it is a different environment with different characteristics and requirements and therefore, it is imperative for us to develop early thinking about, systems, and ways of doing things in the offshore area. We can not afford to have activities and initiatives and problem solving being done in isolation from other groups, communities or sectors. The overall administrative will require good linkages in operations and research and better communication across disciplines and between theoreticians and practitioners. We have the opportunity to apply light handed regulation and develop co-management and co-operation in management systems. At the same time it will be important to have an appropriate administrative infrastructure which will support this and enable the linking and integration of activities, processes and information whenever required. The spatial infrastructure supporting the administration will need to be coherent, appropriate and affordable. It should enable the alignment of all systems and procedures of rights, usage and management so that the spatial referencing is consistent and readily interrelated for all users. There is now a great opportunity to develop a spatial information infrastructure theme as a component of the wider marine resource infrastructures. As previously mentioned the fundamental conceptual work on a unified datum across the full expanse of New Zealand's potential new territory of land and sea has already been done. The extension of this spatial infrastructure can be developed in a flexible manner so its form is adapted to the features relevant to marine environment and to the user applications it will be required to serve over many years ahead.

We can extrapolate from land position but we should do this innovatively so as to use emerging thinking and technology. The Internet, global positioning and digital technology all support an 'open systems' concept in marine resource management. Remote sensing and various swath mapping techniques all support more cost effective monitoring capability. We need to build a marine regulatory system and a cadastre that underpins offshore rights and responsibilities and sensibly matches its onshore counterpart. It's development can be aggregated flexibly and incrementally in a spatial framework underpinning the administrative infrastructure.

A ready acceptance from the outset of co-ordinates of different forms as reliable systems of reference and where required as legally defining definitions of the location and extent of ownership or resource use interests, rights and obligations will be essential. Similarly there will need to be the acceptance of standards for common data bases and reference systems and the use of effective meta data to link databases in terms of descriptors and content widows. An important need will be to overcome the present inadequate data gathering and analysis and develop a comprehensive referencing and marine information infrastructure. Using international collaboration and global data bases we can improve the co-ordination and quality of spatial information and research related to this.

Good governance will involve a strategic approach with planning guidance systems to shape the high levels of incremental development likely as needs and policies emerge. Effective governance can be light handed with the appropriate administrative infrastructure to support integrated management of the territorial area. It should involve all sectors of the community to find comprehensive solutions and derive optimum benefit. Effective education and research initiatives will be needed in developing an effective support infrastructure and governance.

We need as a jurisdiction to start early on developing the infrastructure and the structures, including the spatial information layer component. If we can do this successfully then the economic contribution of the new ocean frontier to New Zealand's and the global economy and environment will be highly beneficial. Through early leadership we can spell out the form of the spatial infrastructure and the planning now necessary to anticipate the needs for using and managing sustainably the resources of this vast new marine frontier soon to be added to NZ's jurisdictional territory. We should anticipate that we are not alone among the professions in either our interest or in the contribution we can make to the sustainable development of the offshore marine resource. The time is appropriate to develop a collaborative approach on the development of the administrative infrastructure for the new territorial sea and ocean areas with our sister professional associations. There is now a strategic opportunity for professional engineers, planners, surveyors, etc. to develop combined professional thinking and planning, on the marine resource administrative structure needs of the new territorial areas of sea and ocean. They have the capability to strongly influence each jurisdiction claiming new maritime territory in terms of UNCLOS to initiate a strategic study and report on the development of a marine resource administration infrastructure. Issues that need to be considered are the administrative governance, regulatory structures and service delivery mechanisms, marine resource planning and environmental effects

management and the establishment of an appropriate spatial information infrastructure.

CONCLUSIONS

There is a need to demonstrate the sound stewardship of the governance of new marine territorial areas in terms of UN directions on sustainable development and habitat and in terms of New Zealand's own economic development strategies. The activity already in maritime areas and on land is insufficient to provide a model which can be simply projected offshore. Development of new open ended strategic planning and administration is called for. From the outset initiating effective governance will be the key to obtaining sustained benefit. This involves the development both strategic structures and frameworks. An important facilitating component in this new marine resource administrative infrastructure is the spatial information infrastructure. The current range of spatial technology and the emerging ocean technology offer an unparalleled opportunity to support policy directed self managing systems of jurisdiction. This will not evolve however, without vision and leadership. The challenge to the New Zealand maritime community, Government and international agencies is to begin to initiate governance and strategic planning of a scale and form not previously experienced. Sustainable development of territorial ocean resources is a big challenge but the successful outcome will reward the both the New Zealand and international economies and environment in a manner that will be of great benefit to future generations. It is appropriate that the surveying, engineering and resource management professions take up the issue of administrative and spatial infrastructures and press for early strategic thinking, planning and research. It is equally appropriate that as nations move towards claiming the entitlements to extent their territorial jurisdictions that arise under UNCLOS there is assurance given of their ability to meet fully their international obligations. An effective marine resource infrastructure offers the vehicle for demonstrating the capacity of national governments to enhance the sustainable development of offshore marine resources as a basis for their receipt of full jurisdictional rights.

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