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5.0 Areas of research interest

The following section covers areas of interest for future research. They are distilled from the desk-top material, case study work (Appendix 5) and from the interviews with organisations and individuals documented in the previous section.

5.1 Inventories, baseline research on ecological processes and socio-ecological systems

As mentioned above, one of the highest research priorities registered during the course of the interviews was for inventory and baseline studies of the current state of the environment. Information is needed to assist people to better understand the nature and causes of particular observed changes to the condition of riparian and wetland environments, particularly those in close proximity to Indigenous residential settlements. Such information will also assist in assessing the likely impact of various development scenarios, including increased population growth and resource pressure within Indigenous estates.

Ecological research should, where possible, seek to integrate Indigenous uses, values and interactions within a system-wide approach that includes people and their environmental relationships. Consideration should be given to prioritising biological research on resources of importance to Indigenous people, as these may differ from those most highly valued by the non-Indigenous population.

Information on Indigenous riparian resource use, dependency and value is required in order to assess socio-economic impacts arising from development projects. For example, diversion of the McArthur River to allow for intensification of mining was cited as a major development that may proceed in the absence of a comprehensive understanding of the costs to local Indigenous communities. The socio-economic impacts of water trading could be given close attention in the regions where there is likely to be increased consumption of water under market-based systems. Studies of the assets and values would greatly assist communities, representative Indigenous organisations and other decision-makers when evaluating impacts from proposals and developing mitigation measures.

Such studies might include cultural values inventories and mapping, baseline studies to establish trends in key environmental parameters such as river flows, groundwater/surface water availability, sedimentation and nutrient runoff from agricultural practices, fisheries baseline information etc. Of critical importance is the capacity of the researcher(s) to build direct relationships with traditional owners and to work in a way which allows for maximum communication and understanding. This requires extra effort on behalf of the researcher(s), and attendant resources, to explain techniques, communicate information carefully and in appropriate formats, and to meet local knowledge requirements.

5.1. Social impact assessment

Closely related to this research area is the need for a critical evaluation of the adequacy of environmental planning instruments and social impact methodologies to enable sufficient consideration of the impacts, for example, of certain irrigation practices on Indigenous livelihoods. These activities are not always subjected to formal environmental impact assessment. Furthermore, social impact issues, where they are considered, are rarely adequately integrated into environmental impact assessment processes. Once assessed, the social impacts of development proposals are not usually monitored. Research into performance indicators to monitor socio-economic impacts could make a contribution to minimising adverse impacts on rivers from land and water resource developments, and enhancing the benefits from such developments, where these may be derived.

Participatory research that enables Indigenous people to identify the key social impacts on their terms, the preferred means of evaluation and appropriate indicators for management would also be of value.

5.2 Institutional arrangements

Social and institutional complexities confronting river and integrated catchment management require that attention is given to scale, power and cultural differences. In complex socio-ecological systems diverse interests will need to be taken into account and the differing types of rules and rights associated with various resources understood. Catchment management research should seek to understand the interactions between the ecological and social systems, especially between resource users, resources and the institutions governing their access, use and management.

Finding mechanisms to identify relevant stakeholders, both inside and outside the catchment, then proceeding to facilitate information exchange, mediate conflicts and negotiate mutually acceptable catchment management options is, as many will be aware, not an easy task. Differences in power between groups will affect planning and management processes, and these differences should not be ignored (Swallow *et al.* 2001). Information has a crucial role to play in processes that need to adapt to change:

*In order to sustain effective adaptive management, stakeholders need to have access to information about the evolution of the system and the impact of their actions on it. When stakeholder groups **participate** in the generation and interpretation of that information, the distinction between research and management starts to blur. It becomes difficult for formal researchers to maintain their traditional role as objective, disinterested outsiders to the process (Swallow *et al.* 2001: 451; emphasis in original).*

Involvement of resource users in catchment management has significant implications for catchment research, particularly the requirement for improved organisational mechanisms and processes for collective decision making and action (Johnson *et al.* 2001). New research methods based on participation of user groups have evolved, but the impacts are wider:

In addition to changing the way technologies and practices are developed and disseminated, participation broadens the research agenda, bringing in new topics like organisational behaviour, collective action and conflict resolution (Johnson et al. 2001: 517).

The field of participatory research looks at the involvement of the intended beneficiaries of research in the research process (Johnson *et al.* 2001: 511). Strong parallels can be seen between this focus and the Indigenous research reform agenda discussed above.

The need for effective governance structures is now widely recognised as fundamental to sustainable resource management practices (Dodson and Smith 2003). During the past 30 years in which significant tracts of land have been claimed by Indigenous groups in north Australia, the dominant land use and management institutions have been concerned primarily with winning the contest over land (and sea) and resource rights. Renewed attention on natural and cultural resource management and the desire to realise the gains of the land rights era, will require an investment in 'either institutional redesign and strengthening to reflect NRM interests, or in the establishment of new institutions' (Altman 2003b: 4).

The lack of Indigenous involvement in resource governance decisions relating to rivers has been observed by a number of commentators (Behrendt and Thompson 2004; Jackson *et al.* 2005; Langton 2001; Sheehan 2001). Tropical river management could be assisted through a greater understanding of the institutional arrangements that will contribute to improvements in Indigenous governance and participation in catchment management, including barriers to, and problems associated with, devolution of power to local communities (see for example, Land and Corbett 2005).

5.2.1 Scale and Indigenous governance

Beyond the property or plot scale, farmers, pastoralists, land owners and managers all need to consider how to coordinate their activities with upstream and/or downstream users of land and water. Rarely are cultural or administrative boundaries consistent with hydrological boundaries. In fact, rivers very often form a boundary between administrative areas, whereas they are located in the centre of catchments.

Scale is an important consideration in designing or reforming resource management institutions. With attention being given to regional approaches to cater for the interdependence of resource management problems across the landscape the question of scale is significant. Reflecting on the circumstance in central Cape York, Smith and Claudie (2003) observe that there is a conflict between the micro-scale orientation towards 'families' and 'estates' preferred by Traditional Owners, and the continuing administrative emphasis on regionalisation. Although mainstream organisations and agencies promote the suitability of the 'region' as a site for the organisation of interaction, in the experience of Kaanju people this limits their involvement in decision-making with regard to their country. In their view the regional approach ignores 'proper' Indigenous governance structures, and reproduces the dominance of mainstream forms of land management (2003: 7). This issue is also addressed by Lane and Corbett (2005) who are critical of NHT processes that focus heavily on regional scale planning to accommodate elements of Indigenous social organisation, especially the intensely localized nature of traditional land interests (2005: 149; see also National Oceans Office 2004).

In most catchments, and particularly in those subject to development pressure where catchment planning is most needed, there are also likely to be significant non-Indigenous interests, such as recreational fishing and tourism. Multi-stakeholder organisations, such as catchment management bodies, are therefore likely to grow in number and influence in river regions given the diversity of interests affected by water resource use. Relationships between emerging regional governance structures and Indigenous organisations have received little attention from researchers (see Lane and Corbett 2005), although there is a growing interest in suitable forms of regional governance for service delivery to remote Northern Territory Indigenous communities (see Holcombe 2004).

As observed in the Daly case (Appendix 5), the adequacy of Indigenous representation and participation in newly created or adapted regional management structures may be severely constrained by poorly conceived models of political representation (Jackson *et al.* 2005). Further,

Regional resource governance structures need to be cognisant of contemporary Indigenous socio-political networks, customary resource rights and traditional methods of decision-making, although these are not beyond adaptation and transformation (Martin 2003). It is equally important for Indigenous people, who no longer operate in an 'autonomous arena of Indigenous values and practices' (Martin 2003: 5) to consider how to adapt existing or design new institutions to enhance engagement with mainstream governance structures (Jackson et al. 2005: 109).

Research on the means and mechanisms to improve Indigenous participation and representation in the growing number of regional land and water management structures is warranted. Evaluation of current practice could contribute to improvements in the knowledge base in this area. Do communities have sufficient control over decision-making? If not, where does the control lie, and what part have institutional arrangements played in creating an imbalance of power. An evaluation of community participation could analyse:

- the extent to which legislation and policy devolves significant control over decision-making to the regional or local scale ie how decentralised are the planning and decision-making structures;
- relationships between government, non-government and Indigenous parties, including industry stakeholders, and conflicts that may have emerged over NRM issues;
- how well the NRM institutions and processes accommodate cultural difference and intangible social values, and
- the extent to which community management structures represent all community resource users.

This latter point relates to the problem arising from an uncritical view of the term 'community' in Indigenous contexts. 'Community' is very often used to suggest a unity and coherence of aspirations, values and backgrounds. Yet in many parts of Australia Indigenous settlements comprise a diverse range of groups from different language groups, clans and home countries considerable distances away. As Lane and Corbett (2005) argue:

Failure to acknowledge the plurality of Indigenous interests can render invisible the particular interests of certain groups. Operationally, the intensely localized character of Indigenous social and territorial organisation renders European notions of representative governance at odds with an Indigenous politics based on direct involvement (2005: 149).

There are other features of Indigenous decision-making and institutions that are likely to have a bearing on tropical rivers and water management. For instance, in much of the tropical rivers region, customary title to land and resources is communal. Altman and Whitehead (2003) argue that the form and character of Indigenous tenure systems 'suggests that (landcare) approaches emphasising communality and inter-generational sustainability will be important' (2003: 1). Institutional frameworks that embrace the articulation between Western land and water resource law and policy and customary water use, rules and norms should be further examined for their potential application to northern Australian circumstances. For example, for future water resource markets to

function efficiently Indigenous property rights in water will need to be recognised and any particularities accommodated, e.g. their communal nature (Altman 2004).

5.2.2 Participation and visioning tools

Participatory planning has undoubtedly grown in popularity in recent years (see Walsh and Mitchell 2002), but how well is it working in Indigenous contexts? There is little use of modelling and decision-support in Indigenous contexts, what scope is there to increase the use of these technologies to improve rates of participation and the quality of decision-making. What approaches, centred on social learning and participatory action among diverse stakeholders, can be used to encourage sustainable use and management of water and riparian resources? There is need to test which tools and technologies will suit Indigenous people and their forms of knowledge and decision-making, as well as taking into account their desire for applied research of direct and immediate benefit. Computer simulation models of the impacts of alternative land uses may involve some user input and feedback but tend to be driven by researchers and their frames of reference (Johnson *et al.* 2001). How can collaboration across knowledge systems ensure that the researchers are basing their working on the correct set of assumptions upon which these tools rely?

Matters concerning Indigenous land and resource ownership and environmental management are often intensely contested. There may be uncertainty in the legal rights afforded Indigenous groups, and differing world views can generate misunderstanding and conflicting values and aspirations amongst groups. Negotiation and mediation processes are currently rarely used. A better understanding of how to conduct and evaluate such procedures is required.

5.2.3 Evaluation

Bellamy *et al.* (2001) emphasise the need for effective means for evaluating the success of NRM policy initiatives. There has been an increase in catchment scale NRM projects that often fall far short of community expectations' (2001). Yet assessing the impact of catchment management and research is inherently difficult:

*The human and biophysical systems are complex, and changes can often only be observed over long time periods. The magnitude and distribution of economic, social, institutional and environmental impacts must be considered. Since finding identical 'control' watersheds with which to compare project watersheds is usually not feasible, careful attention must be paid to the contribution of other factors to observed outcomes (Swallow *et al.* 2001: 23).*

Selection of sites to examine this question may need to ‘focus more on important or extreme circumstances’ whose results could provide insights into specific aspects of catchment management, rather than on a set of ‘representative’ sites (Swallow *et al.* 2001).

Research from NSW suggests that Indigenous interests have been inadequately accommodated in NSW water sharing processes (Behrendt and Thompson 2004). They were neglected in the NT’s first water resource strategy at Ti Tree. There is a strong need to develop indicators and monitoring systems that track how well Indigenous people are participating and how well processes are meeting their objectives. Research could examine the extent and quality of the participation of Indigenous people in the processes that lead to the implementation of water resource management plans. A review of the implementation and effectiveness of measures intended to benefit Indigenous people in such plans would be also be valuable.

5.3 Natural resource-based enterprises

Policy analysts such as Altman (2003a; 2003b) and Whitehead (2003) have contributed to an improved understanding of the barriers to Indigenous participation in the commercial use of native flora and fauna.

Greater commercial use of living resources will require some degree of devolution of authority to local people, and the ability to monitor harvesting rates and other impacts. Whitehead (2003) notes that at least one Indigenous community has initiated action to obtain assistance so as to ensure local impacts are managed:

... a community in central Arnhem land concerned about the potential for over-harvest of one timber species for carvings sought assistance to examine options for achieving sustainability, without prompting by regulatory authorities. Although there appears to be little immediate risk, they have established careful monitoring systems to track usage and the condition of wild populations (2003; 11).

This example highlights the need to develop methods for local monitoring and management based on principles derived from systems of customary authority and that satisfy regulatory authorities (Whitehead 2002). Rigorous research obviously has an important role to play in determining the limits to sustainable use, strategies for adaptive management, including monitoring, and in marketing. It can also contribute to better recognition of the subsistence economy, particularly in areas where there are competing pressures on the resource base from agricultural proposals.

5.4 Water reform and the National Water Initiative (NWI)

Current changes to the institutional landscape include changing resource values, particularly the increased value of water and rivers. Australian society now places greater emphasis on water as an input to agriculture and horticulture, as a commodity to be traded, as well as the source of life sustaining biodiversity, amenable and popular landscapes and lifestyles. These changes are now influencing attitudes, values and environmental and resource policy in north Australia. How they articulate with Indigenous values, objectives for water use and resource rights recognised at common law and in statute is not yet clear, but nonetheless important to the successful implementation of the National Water Initiative. As stated earlier, national water policy formulation has to date given insufficient attention to implications of water reform to Indigenous people (Mackay 2002). The neglect of Indigenous interests is apparent in the low rates of awareness of the water reform agenda amongst Indigenous people and organisations surveyed for this study.

Indigenous interests need to be considered, understood, valued and integrated in any emerging water property rights and management frameworks. In most regions of north Australia where water use may intensify and trade opportunities are likely to expand, Indigenous communities will need assistance to plan for their own water use, consider models and approaches to enhance their participation in management structures and to derive benefits from the commercial use of water.

Behrendt and Thompson (2004) describe the limited ability of Indigenous people of NSW to contribute to the development of water sharing plans and other water resource instruments established by the *NSW Water Management Act 2000*. They recommend that steps be taken to improve Indigenous people's understanding of the importance of the new management regimes. Further, that people are assisted to identify their options for achieving outcomes from the water sharing process (ibid). They show that in various water sharing plans in NSW, the Government has yet to establish the mechanisms that would increase Indigenous people's share in the benefits of the water economy and thus, in the case of the Karuah River Water Sharing Plan, 'these early plans cannot effectively address these targets' (2004: 105).

Ensuring the provision of sound information to all sectors at key decision points is an explicit objective of the National Water Initiative. There is a pressing need to build the capacity of north Australian Indigenous organisations and communities to respond to the Initiative. The formation of an Indigenous policy group could oversee the development of a research program designed to address the issues arising from the NWI of greatest priority to Indigenous organisations; produce communication materials for northern Indigenous communities and, ultimately, generate and endorse policy documents for government, industry, research and non-government sectors on a range

of issues including best-practice in Indigenous participation in water resource planning and other standards for working with local Indigenous communities.

There is a need to clearly identify and document Indigenous interests and to determine how well they are understood by water resource managers implementing the goals of the NWI. For example, does the legislation across the tropical rivers region clearly identify and recognise Indigenous interests in river systems? Research into the range of options for recognising and protecting Indigenous land and water interests could assist in the development of models e.g. what opportunities are there for land/water use agreements to encompass water rights and resolve conflicts.

Sheehan (2001) argues:

If it is accepted that Indigenous property rights in rivers and riverine lands may have survived to varying degrees throughout Australia, then it would appear only prudent for an understanding to be sought as to what these Indigenous rights and interests can offer in terms of melding those most evident desirable features with current regimes of riparian land use management (2001: 241).

Altman (2004) recommends that COAG 'initiate research case studies that assess the impacts of current water policies and frameworks on native title water rights, and that explore the potential for negotiation of local and regional water use agreements that parallel the Indigenous Land Use Agreement framework' (2004: 32). For instance, in the Ord River region, an agreement between the Miriuwung-Gajerrong people and the Western Australian Government will see the native title holders obtain rights to water and participate in water and land use decision-making should the expansion of the Ord irrigation scheme proceed. In the absence of considered options from which to choose, there is a strong concern that Indigenous communities will not benefit from the NWI (Altman 2004).

5.5 Incentives for Indigenous natural and cultural resource management

As mentioned above, the idea that Indigenous natural and cultural resource management can contribute to a range of national environmental and social policy objectives is gaining attention within northern Australian environmental policy circles (Langton 1998). Research that documents and makes visible the social and economic benefits of customary resource practice could have an important part to play in providing evidence of the value of Indigenous contributions to biodiversity goals and ecosystem service provision, as well as the means of sustaining these practices. Models for valuing and financing Indigenous land stewardship are currently being explored by

Land Councils and others, including NAILSMA. Positive developments will have a bearing on the capacity of Indigenous people to manage their customary estates, including the river systems.

Whitehead (2005) explains the need for incentive structures:

.. an important core idea is that people deriving an income from the land by using some components of the natural resource base can also act as managers and protectors of many other values, given appropriate incentives. Incentives for Indigenous land managers to see themselves as acting on behalf of other Australians are presently few, partly because customary practice is yet to be widely recognised by the public or Government as conservation management work because it includes consumptive use, and because there has been limited access to the resources needed to go beyond the customary to meet new challenges or resource management opportunities (2005: 5).

Whitehead (2005) has formulated a set of research questions concerned with the institutional arrangements that govern the allocation of resources. They are readily applicable to the use and management of aquatic resources and are as follows:

- Review the effectiveness of prevailing regulatory regimes, including property rights in native wildlife and plants, for encouraging sustainability and ensuring equity of access;
- Investigate alternative property rights regimes, including review of international experience;
- Develop models to assess the potential economic (and consequent social) impact of changes in property rights and associated regulatory regimes in the region;
- Develop options for linking commercial use of feral animals to efforts to control detriment to natural and cultural values, including bio-economic models of tradeoffs, and
- Investigate markets for novel products from Indigenous lands, and in particular the market value of a connection with Indigenous lands and people (2005: 7).

For example, an alternative property rights regime for fish management might provide indigenous people with the ability to regulate fishing activity, ensure access to the resource for subsistence purposes and obtain a financial benefit from recreational fishing, thereby contributing to remote area livelihoods.

5.6 Tourism: regulatory systems to manage competition and conflict

There is a need to investigate more closely the interaction between the tourism sector and north Australian river systems, particularly the impacts on Indigenous communities. As mentioned in the previous section, tourism growth is generating significant pressure on the resources utilised by Indigenous communities. Competition for access to water bodies has a particular social dimension which should be given closer attention, as should the means by which Indigenous communities might have a greater say in tourism management. Conflicts can arise from differences in norms and behaviour, for example, in fishing practices, not just over the sheer competition of numbers of people at certain locations.

Stoeckl, Greiner and Mayocchi (2006) state that planning and management may be able to influence the impact of regional tourism by targeting visitor segments deemed to have the most desirable (or least undesirable) impact upon the local community. Further research could identify different behaviours of different visitor segments, their impact on Indigenous communities, and means of mitigating those impacts. According to Stoeckl *et al.* (in press):

... if one can also identify different motivations/drivers of those different segments, then it may be possible to manipulate the visitor mix thereby raising the net community benefits of the regional tourism industry (e.g. encouraging those deemed to have a positive impact upon the community whilst discouraging others (in press).

The emphasis given to tourism in the interviews was on the negative impacts of unregulated tourism activity. Research should also be undertaken to enhance the benefits to Indigenous communities from water and river-based tourism. Interactions between tourism and other activities, including customary use of wildlife would need to be explored (see Whitehead 2005) as would the governance and institutional issues that are generic to any small enterprise.

5.7 Access to rivers on Crown Land

There is a need to explore avenues to improve public access to rivers where one needs to traverse Crown land under pastoral lease. Pastoralists have a legitimate desire to see popular sites managed and their rights to graze cattle respected. At present customary use of land and resources is provided under various statutes, however, anecdotal evidence suggests that it is difficult for traditional owners to make full use of these provisions. Models for co-operative management arrangements, e.g. agreements, alternative property rights regimes, should be explored. As a first step, present statutes regulating access could be reviewed and the social consequences of prevailing practice assessed.

5.8 Water quality indicators

A number of Indigenous communities across the Tropical Rivers Program area are developing the capacity to monitor water quality. Some of these projects are drawing on the assistance of Greening Australia through their Water for Life program, while others are working with their state water resource agencies, e.g Halls Creek, WA (Pursche 2004). Current indicators of water health, for example guidelines under the National Water Quality Management Strategy, were developed without input from Indigenous people. In New Zealand, indicators have been developed to assess the condition of water quality and waterways according to Maori evaluation criteria (Tipa and Tierney 2003).

Research into the suitability of current water quality indicators to Indigenous environmental and resource assessment methods and criteria would be useful in ensuring that monitoring programs were well-targeted and appealing to local communities, as well as sufficiently rigorous.