

**NORTHERN TERRITORY
GOVERNMENT**

SUBMISSION TO

**THE HOUSE OF REPRESENTATIVES
STANDING COMMITTEE ON PRIMARY
INDUSTRIES AND REGIONAL SERVICES'**

**INQUIRY INTO THE
DEVELOPMENT OF HIGH
TECHNOLOGY INDUSTRIES
IN REGIONAL AUSTRALIA
BASED ON
BIOPROSPECTING**

INTRODUCTION

The Northern Territory Government welcomes this Inquiry as part of its strategy to encourage industries to establish in regional, rural and remote parts of the Territory.

With 47% of the Territory's population living outside the major urban centre of Darwin, the importance of new and existing industries establishing and growing outside urban centres has long been recognised by the Northern Territory Government. With appropriate support, bioprospecting industries would be well placed to establish in the Territory and help achieve economic development in rural and regional areas.

TERMS OF REFERENCE

- (a) The contribution towards the development of high technology knowledge industries based on bioprospecting, bioprocessing and related biotechnologies;

The Territory has had some practical experience in bioprospecting during the last five years through an arrangement with a pharmaceutical company. To date, in the early or 'discovery' stage of this project, there has been little benefit to the development of high technology businesses. This discovery phase involves extracts of the 'bioprospected' material being screened for possible uses. The screening process is highly specific and highly targeted and produces an indication of the potential of an extract against given criteria. Tens of thousands of screens can be performed on minute quantities of extracts. This screening process is usually a highly automated system, undertaken without particular attention to prior use, such as traditional usage.

Benefits could have accrued to the Territory had more of the sample processing and extraction been undertaken in the NT. However, the reality is such that a company is likely to want all sample screening activities on one site for reasons of economics, security of samples and consistency of treatment. A company engaged in bioprospecting is likely to be receiving material from several geographically dispersed sources. The duplication of processing or extraction centres is not likely to be attractive.

Some consideration could be given to regionalisation of screening, particularly in tertiary institutes. Most screening processes now are very sophisticated and are developed to specifically target certain diseases. The more screens a sample can be processed through, the greater the chance of a successful discovery.

There would seem to be potential for both screen development and the subsequent processing of samples through screens in regional centres such as Darwin. It is certainly in the interest of the NT for samples to be processed through as many screens as possible. (This is one disadvantage of the present arrangement with a single company that will only operate a small number of screens at any one time.)

If it is accepted that development of high technology industries in regional areas will be best facilitated by progression of screening successes then this in turn will be advantaged by any factor that increases success from the bioprospecting. As such, a limitation in the number of screens will be a hindrance to development of regional high technology industry. The operation of drug screens is already happening on a smaller scale in a number of Australian universities.

If drug companies could be encouraged to contract out screen development and screen operation to regional centres that already have some infrastructure to conduct this work, economic benefits could begin to flow into those regional centres.

Recent developments in the NT also indicate that there could be some regional economic success with less high technology drugs that target more of the 'alternative' medicine market, including 'botanical medicines' and 'natural remedies'. The alternative medicine market is a rapidly expanding market and estimated to be worth in excess of \$10 billion in Europe and North America. This industry may not be viewed as high technology but, if successful, will stimulate horticulture and/or wild harvest activities.

It would be short sighted to ignore these 'lower technology' activities as legitimate industry. In fact, in the Territory's experience, these types of activities are likely to have more relevance, a greater chance of success and be more acceptable to remote communities (especially Aboriginal remote communities) than the high technology end of developments.

Whilst the high technology approach to bioprospecting through screening might not make much use of traditional knowledge, in the alternative medicine market, such knowledge may be highly valued as evidence of efficacy and safety demonstrated by long term use.

Tapping into this market and developing some capacity and experience with the potentially lucrative but less technically-demanding 'alternative' option will contribute to a local knowledge base and foster the interest, technical capacity and infrastructure needed to enter the higher technology end of the industry.

The Northern Territory has a particular strength in this regard due to the large Indigenous population, some of whom maintain traditional uses.

(b) Impediments to growth of these new industries;

An important constraint which could become an impediment in the development of relevant new industries, or indeed to activity at any level of bioprospecting, is clear and agreed ownership of the resource. With botanical samples (which in most jurisdictions are probably determined as fixtures of the land and hence belong to the landowner), this issue is less problematic. However, there is considerable interest in marine organisms and other micro-organisms from a diverse array of sources. Ownership in these instances is often less clear and varies with the relevant legislation in the jurisdiction.

The issue of ownership has been dealt with in the Territory's current bioprospecting contract. The contract requires the Parks and Wildlife Commission of the NT to provide samples of flora at an agreed price to the company. The contract also specifies terms for further collection based on screening successes and an arrangement for future royalties. The contract also specified conditions in relation to third parties engaging in similar activities in the NT or engaging with the pharmaceutical company.

To avoid future questions of ownership of the samples and hence distribution of benefits, the collecting activities have been confined to Government owned or controlled land. The company was able to negotiate an additional contract with the Tiwi Land Council, which stipulates the Parks and Wildlife Commission of the NT as the agent for the collection, identification and vouchering of the botanical samples.

In the interests of retaining any downstream activities or "spin-offs" in the NT, the NT Government negotiated for clauses that gave first right of refusal for many aspects of such downstream work. This included activities such as any medical research projects that could be undertaken by the Menzies School of Health Research, research within the capability of the Northern Territory University and horticultural research to be undertaken by Darwin Botanic Gardens.

Turning to Aboriginal issues, in the NT 42% of land is under Aboriginal ownership with a further 11% under claim. Dealing with Indigenous rights and aspirations is a condition precedent, which does not exist to anywhere near the same extent in other jurisdictions. Both the Convention on Biological Diversity and the National Strategy for the Conservation of Australia's Biological Diversity (the Strategy) provide significant commitments to Indigenous peoples.

In particular, the Strategy provides at Action 1.8.2:

“Ensure that the use of traditional biological knowledge in the scientific, commercial and public domains proceeds only with the cooperation and control of the traditional owners of that knowledge and ensure that the use and collection of such knowledge results in social and economic benefits to the traditional owners. This will include:

- (a) encouraging and supporting the development and use of collaborative agreements safeguarding the use of traditional knowledge of biological diversity, taking into account existing intellectual property rights; and
- (b) establishing a royalty payments system from commercial development of products resulting, at least in part, from the use of traditional knowledge.”

Within and between different Aboriginal communities there is clearly a diversity of views regarding bioprospecting. These views vary from embracing the potential that might arise from bioprospecting to vehement opposition. Much of the opposition stems from uncertainty about ensuring ownership, intellectual property rights and an appropriate level of economic return. Even with an understanding of these issues, some communities will still take a position of not wanting to sell off the access to their biodiversity. This is a position that has to be respected and accepted as legitimate.

There is no doubt that Aboriginal people can work through these issues as evidenced by the bioprospecting agreement with the Tiwi Land Council. The returns that communities expect from bioprospecting can also vary considerably and may take the form of royalty arrangements, establishment of a small-scale industry, training or the facilitation of recognition, recording and strengthening of their culture. Such aspects go to the heart of benefit sharing as provided in the Convention of Biological Diversity. The spirit of this part of the Convention should not be lost in any consideration of regional industry developments.

The serendipitous nature of high volume random screening bioprospecting, the low chances of success and the high volume of diversity that needs to be sampled, mean that the chances of a pharmaceutical bonanza for any single community are very low. This is not always well understood. Nor is it often understood that prior knowledge of any traditional use is unlikely to play any role in high volume sampling. This can lead to unrealistic expectations of the value of the material or at the very least an uncertainty of what is a fair and equitable arrangement.

If Australia is to be more than a bioprospecting mine and is instead to develop value-adding industries, it may wish to emulate Singapore. In its article entitled *Ready for the Biotech Boom*, the *Far Eastern Economic Review* reports:

“Perhaps the most determined Asian country is Singapore. With characteristic single-mindedness, the city-state has taken several steps to pursue biotech research and promote science. It has put more biology into its school curricula, endowed more scientific scholarships, showered tax breaks on pharmaceutical firms, set up public investment funds that invest in biotech, and brought in medical institutions like the pre-eminent US research centre, Johns Hopkins. Most recently, on June 2 the Singapore government signed a \$40million deal with Chiron, one of the biggest US biotech firms, to set up a research and drug-discovery venture. Research will focus on infectious diseases and terminal illnesses prevalent in Asia.” (*Far Eastern Economic Review*, p45, 15 June 2000).

It would appear from this article that, rather than focus on pure scientific research, the emphasis in Singapore is on developments that have a clear commercial potential. The emphasis is also on researching diseases which are more prevalent in Asia, such as liver and nasal cancer.

Educating more scientists and providing opportunities for them to remain in Australia and developing niche research, is, as the Commonwealth Government has recently recognised, a way forward.

A specific example of an area in need of more scientists is taxonomic research. Taxonomy is the science of discovering, describing and naming of the individual species of plants and animals, including microscopic forms, which make up biodiversity, and of working out their relationships in order to provide a classification. The taxonomy for groups such as mammals, birds, some higher plant groups, and some species of insects and molluscs has been reasonably well completed. These species, however, comprise only a small portion of the flora and fauna, and little is known of the taxonomy, distribution, biology and genetics of the vast majority.

The skills base in taxonomy in Australia is very poor: there are currently fewer taxonomists employed in Australia than in 1980 (*Australia's Marine Science and Technology Plan*, Department of Industry, Science and Resources, Canberra, 1999) and this is a major impediment in undertaking large biological surveys and bioprospecting of our biological resources. The knowledge gaps in our taxonomic systems and a shortage of trained taxonomists in Australia, are significant deficiencies in managing and using our biological diversity (*The Darwin Declaration*, Australian Biological Resources Study, Environment Australia, Canberra, 1998).

At present, much of the taxonomic expertise in Australia resides in State and Territory museums and herbaria. These institutions have a significant role in the identification of resources for bioprospecting. Bioprospecting has the potential to stimulate and provide funding support for improved taxonomic knowledge of Australia's fauna and flora. It also has the potential for enhancing our knowledge of the biodiversity of key taxonomic groups/taxa and of particular geographic areas.

- (c) The capacity to maximise benefit through intellectual property rights and other mechanisms to support development of these industries in Australia;

It is noted that the Aboriginal and Torres Strait Islander Commission (ATSIC) attempted, unsuccessfully, to incorporate provisions for protecting Indigenous rights in knowledge and biodiversity in a submission to the Senate Committee looking at the Environment Protection and Biodiversity Conservation Bill in early 1999.

The resultant legislation, the Environment Protection and Biodiversity Conservation Act 1999, makes the following recognition in Section 3 – Objects of the Act:

- (f) to recognise the role of Indigenous people in the conservation and ecologically sustainable use of Australia's biodiversity; and
- (g) to promote the use of Indigenous people's knowledge of biodiversity with the involvement of, and in co-operation with, the owners of the knowledge.

Clearly, whilst the Act recognises the role of Indigenous people and encourages promotion and involvement, it stops short of actually recognising intellectual property rights to the biota.

- (d) The impacts on and benefits to the environment.

The early discovery phase of bioprospecting, as a general rule, has negligible environmental impact. The quantities required of each species are trivially small (tens of grams) and other than for small herbs the sampling is not individually destructive.

The NT program has to date provided some benefits to the environment through the gathering and improvement of biodiversity data. Collecting has concentrated on poorly known areas and in the National Park estate. Having botanically skilled people in these areas has resulted in the discovery of new species to science, new records both nationally and regionally and an improved botanical database for many parks and reserves. However, it would be fair to acknowledge that the direct financial contribution of the project to conservation up to this stage is minor.

Subsequent stages of drug discovery have the potential to impact more seriously on the environment. The requirements for several kilos of material for further testing could require the destruction of many individual plants depending on the plant part required. Even if the sampling is non-destructive, such as fruits, the ecological impact of this removal could be severe. Further stages of testing leading to commercial harvest have the potential to be highly destructive. Ultimately, if a commercial market is established that depends on wild harvesting then careful monitoring will be needed to minimise the environmental impact.

There are many contemporary examples elsewhere in the world where monitoring has failed. For example, the bark of the African tree *Prunus africana* became a highly sought after drug in Western Europe. The traditional non-destructive harvest of taking small amounts of bark was replaced with total felling or stripping of the bark to meet the new demand. The species is now highly threatened.

Under the sustainable utilisation of wildlife policy, the Northern Territory Government (primarily through the Parks and Wildlife Commission of the NT) has mechanisms to control and monitor such a harvest.

Conservation will benefit from activity that adds a tangible value to the diversity of native plants and animals and the habitats that support them.

CONCLUSIONS

The Northern Territory Government recognises that bioprospecting is a long-term process with high investment and development costs to the bioprospecting company and very long odds for significant economic benefits. However, given the exceptionally high level of endemic species throughout the Territory, the odds might be reduced in the Territory's favour.

Whilst fully supportive of high technology industries, regional development can also occur via small-scale operations. Low technology options may be of more interest to remote communities and have a short to medium term financial return rather than the sometimes quite exceptionally long-term high technology options.