KARST MANAGEMENT TOOLS - REVEGETATION

- Peter Ackroyd

Introduction

Revegetation is the deliberate attempt to restore the original plant cover and its associated ecosystems to an area which has for some reason had its original vegetation damaged. This usually requires research into what the endemic (original) plant species were, establishing their original distribution and co-relationships using old records, anecdotal evidence or remnant vegetation patches, the collection of seed from remnant patches of the endemic species (if available) and devising a system for the efficient reintroduction of these species to the damaged area.

Revegetation has until recently been mistaken as a feel-good, aesthetic tool rather than a serious scientific tool in Australia. In the last decade or so we have seen revegetation used by groups of farmers. For example, in Victoria's west and north-west, salt-resistant trees have been planted to act as natural water pumps, thereby lowering the highly saline water tables in these areas and returning the land to productivity. However, in karst management, tree and understory cover has yet to gain full recognition of its importance in the regulation of water yield, erosion control and silt movement.

Gillieson (1996) makes it plain that trees and grasses intercept rain and "protect the soil surface from rain and wind erosion" (p. 71). His "Cascade of carbon dioxide" diagram (Fig. 3.7) graphically illustrates the vital role vegetation plays in the regulation of the very process which creates karst landscapes in carbonate rocks — the dissolution of carbon dioxide in rainwater. Removal of the vegetation cover unbalances this process.

Kiernan (1988) probably puts it the most succinctly: "Maintaining the hydrological system in a natural condition is the foundation stone of karst management" (p. 43). Because the natural vegetation cover forms part of the hydrological system, it is imperative that where vegetation has been seriously damaged or destroyed, attempts should be made by karst managers to restore it.

On public land this may be done directly, either by using paid staff or by encouraging committed volunteer groups to adopt revegetation as a project. For karst areas on private land, owners can be encouraged, as in Victoria, to plant endemic trees and grasses to reduce erosion and minimise karst degradation. At Buchan in Gippsland, Victoria, a volunteer group , the Friends of Buchan Caves, has taken on a long term project to revegetate a significant karst area known as the Potholes Reserve. The reserve is located about nine kilometres north of Buchan, close to the small settlement of Murrindal.

The Potholes consists of a moderate sized doline field measuring 2.0 by 2.5 kilometres in extent. In the centre of this area is the Potholes Reserve, a 50 hectare public purposes reserve for the protection of natural features. This reserve probably contains the highest concentration of karst features in Victoria — there are over 200 documented karst features in this 50 hectares. Until 12 years ago the Potholes was almost entirely freehold land. However, in February 1986 a significant portion of it, Allotment 22A, became available for sale and, after prolonged negotiations involving a committed group of members of the Victorian Speleological Association who each pledged money to purchase the land, it was eventually purchased instead by the Victorian Government and added to the existing reserves on 8th February 1989.

A small (4 Ha) portion of the area, latterly known as Wyatts Reserve, has never been cleared. Because it contained an extraordinarily high concentration of steep-sided dolines, most of them containing caves, Wyatts Reserve was never settled and was eventually set aside as a stock camping reserve, being on the cattle route from NSW. Its status was later altered to its present level of protection and, despite some weed infestation and disturbance, it remains as a reference area for the Potholes. The adjacent road reserves are only slightly more disturbed than Wyatts Reserve and so by and large the full range of plant species for the Potholes remains intact. It was by using seeds from these remnant areas that we planned to revegetate the Potholes.

The Friends Step In

The Friends of Buchan Caves was originally set up on Sunday 15th November 1987. The principal motivator for the group was the enthusiastic Graham Parkes, then Ranger in Charge at the Buchan Caves Reserve. At Graham's suggestion, we organised a small working party, put together some of our ideas and then we added the first Friends project to the caving calendar to assess how much interest there was from other cavers. We were strongly encouraged by the success of that first project — a walking track up to the top of the hill above Moon Cave — and felt that the group was going to be viable. Now, more than ten years later, Friends projects continue to attract the interest and participation of cavers and others interested in karst.

In late 1991 the draft management plan for the Buchan and Murrindal area was released. One of its key recommendations was the revegetation of a major portion of the Potholes Reserve. A floristic survey by a consultant botanist revealed that structurally most of the Potholes Reserve was intact. The restoration of its endemic tree species, cleared by past land owners, would ensure the full recovery of the area to pre-European standard. In particular, the plan made it clear that to do nothing could lead to a high rate of cave degradation through increased acidity of the soil and to a greater run-off rate of water (and consequently silt) into the caves. The plan provided a revegetation model for the Potholes and for the main caves reserve in Buchan (Boadle, 1991).

Acting on this plan, park rangers Graham Parkes and Jim Daly suggested the Friends of Buchan Caves could adopt this long term project. Jim and the then president of the Friends, Geoff Hammond, set the ball rolling by commencing the construction of a fence around a small trial plot of 0.9 hectares on the eastern side of the Potholes Reserve. Construction was commenced in late October 1992 using second-hand electric fencing material "scrounged" by Jim and Graham. The fencing was largely completed by the Friends on their working bee weekend in December 1992.

This weekend also saw the commencement of a continuing weed eradication programme. The main problem weeds were Great Mullein (from Europe), Nodding Thistle, Bathurst Burr, Horehound, and Blackberry. In the newly fenced trial plot these weeds were grubbed out by hand over a period of 18 months — a blistering task.

In March 1993 a solar powered electric fence unit, purchased by the Friends, was installed to keep the area from being damaged by stock and wildlife. In March 1994 a gate was installed to permit easy access to the plot. It was time to begin planting trees. The Friends had been successful in obtaining a $1,000 grant from "Tree Victoria" to aid them in this. Jim organised the propagation of endemic tree species via a specialist Gippsland nursery in late 1993. The initial tree species selected were Yellow Box (*Eucalyptus melliodora*) Buchan Blue Wattle (*Acacia caerulescens*) and Drooping Sheoak (*Allocasuarina verticillata*).

The Start of a Something Big

By July 1994 ten trays of 50 seedlings each were ready for planting out. Four hundred trees were planted and protected with plastic tree-guards in one weekend. The remaining hundred were held in reserve. Little did we know how important this precaution was to become.

On 12th August 1994 a deliberately lit fire raced through the revegetation plot. The fire burned only this one corner of the Potholes. The working bee of September 1994 saw several long faces viewing the damage. Many of the trees appeared to have been burnt to the ground with their plastic guards melted about them. However, upon closer inspection, it was seen that many of the damaged trees remained alive — the eucalypts and the acacias especially.

That weekend saw renewed determination by the Friends to ensure the trees survived. The destroyed trees were replaced and the damaged trees re-sheathed to protect them anew from rabbits. Most of these subsequently pulled through. It was during this same weekend that the Friends said farewell to a strong supporter. The Ranger in Charge, Graham Parkes, was moving on to take up a new challenge as Ranger in Charge of the Grampians National Park. For the next 12 months tree guard replacement and fence maintenance works were carried out and the weed eradication programme continued. The trees started growing taller.

In January 1996 a much more ambitious project was undertaken. This involved the enlargement of the fenced out area to 3.5 hectares (almost 10% of the total area of Allotment 22A) and an application for a community project grant for $4,020 to assist in the planting of the larger area. The grant application was successful.

By July 1996 over a third of that amount had already been spent on weedicide and fencing materials. Three members of the Friends spent over a week of their time at Buchan in September 1996 extending the electric fence up the hill to the southern boundary of the allotment. This involved the driving of many steel posts and the collection of many painful blisters - some of the posts had to be driven several times before a clear spot could be found in the rocky ground. The electric fence system was also upgraded at this time.

Over that summer Peter Ackroyd, Peter Stewart and Jenny Smith collected seeds from nearby eucalypts and acacias. Using adjacent road reserve areas at the same elevation as the revegetation plot as a guide, the species collected consisted of Yellow Box (*Eucalyptus melliodora*), Candlebark (*Eucalyptus rubida*), Manna Gum (*Eucalyptus viminalis*), Black Wattle (*Acacia mearnsii*) and Blackwood (*Acacia melanoxylon*). Arrangements were then made with a commercial nursery to propagate 1,200 trees in forestry tubes. The nursery involved, Moormurng Nursery at Bairnsdale, was extremely helpful and, because of the community service aspect of the project, gave a very good price for the propagation work, supply of fertiliser and tree guards. While the seedlings were growing in the nursery during late 1996 and early 1997, the revegetation plot was extensively weeded using a weedicide applied by hand operated weeding wands. This method provided tight control over the application of the weedicide and ensured there were no over-spray or weedicide runoff problems.

Unfortunately disaster was about to strike. In February 1997 considerable damage was caused to the new electric fence surrounding the revegetation plot. Person or persons unknown had obviously jumped up and down on the wires causing the staples to pull out and the wire tension to be ruined. One corner post was also damaged. Undeterred, the Friends went down to Buchan on the Anzac Day weekend of 25-27 April 1997 and new trees were progressively planted out and were protected by individual tree guards. Many people participated in that first burst of planting activity and almost two-thirds of the plot was covered with a mosaic of tree guards, each with its tree cradled

inside. Despite it being Autumn, normally a good time of year to get trees into the ground, the weather was unseasonably dry. Over the ensuing three weeks, until the first real rain fell, park ranger Dale Calnin returned again and again to the Potholes with truckloads of water to hand-water several hundred seedling trees in rough and steep terrain. Dale, sometimes assisted by other ranger staff, made sure the trees survived till the rain arrived.

The work after that seemed to fall to a handful of diehard Friends who continued with the project, planting out their quota of trees in the steep, rocky but fertile ground. The trees were planted in a pattern matching that of nearby road reserves which best matched the Potholes paddock in terms of elevation and soil type.

On a special working bee a small number of dedicated Friends drove down to Buchan and spent the weekend of 25-26 September 1997 on repairing the vandalised fence. The damaged strainer post was replaced, not without difficulty given the rocky nature of the ground. The last 75 trees were planted on 6th December 1997, just prior to the Friends' annual general meeting held that night. In total, over 1,200 trees were planted consisting of a good mix of eucalypt and acacia species. Weed eradication has continued in parallel with the tree planting and the plot, once heavily infested with introduced noxious weed species like Great Mullein, Horehound and Bathurst Burr now reveals the original mix of Themeda and Microlena grasses.

Conclusion

The estimated cost of all this work, were it to be carried out commercially, was $25,000. However the actual cost, funded by community and environment grants, was just $5,020. The commitment and enthusiasm of dedicated volunteers can therefore be of benefit to karst managers. Groups such as the Friends of Buchan Caves are largely composed of experienced people, knowledgeable about their chosen projects who, if sufficient flexibility is permitted them to get on with the job in their own time and using their own methods, can act as a valuable resource to land managers on a tight budget. Often, in such circumstances, important but unfunded projects can be started and can proceed to a successful completion with the assistance of a Friends group.

Of vital importance to the success of the Friends of Buchan Caves has been the frank and open discussions between the Friends and key Buchan Caves Reserve staff. Without this atmosphere of trust, such long term ventures are doomed to failure. The revegetation of the Potholes Reserve is now more than 20% complete with the end of phase II of the project.

Acknowledgements

The unstinting assistance, often in their own time, of Buchan Caves Reserve rangers Dale Calnin, Robyn Calnin and Jack Lewendon stand out. The Friends have enjoyed the full co-operation of all the Caves Reserve staff over the years but past Ranger in Charge, Graham Parkes, deserves special mention for his trust and belief in the Friends. It was the initial enthusiasm of Graham that enabled the Friends of Buchan Caves to get up and running in the first place. One whose help has been indispensable over the years is park ranger Jim Daly. Jim was appointed by Graham Parkes to be the Friends Co-ordinator. In his quietly efficient and enthusiastic way Jim performed much more than this basic duty - he became an integral part of the Friends. Judy Thompson of Moormurng Nursery in Bairnsdale, Victoria, not only provided her professional services at a special rate for the Friends, but she also acted as an advisor in all aspects of revegetation of native forest.

Finally, thanks to all those members of the Friends of Buchan Caves who suffered the heat, the rain, the dirt, the blisters, the sunburn and the aching backs. Some Friends went that extra yard and a few went several extra yards to overcome adversity and setbacks, but overcome them we did.

References

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