

THE NYMBOIDA POWER(LESS) STATION

Is it economically viable, or an ecologically sustainable proposition?

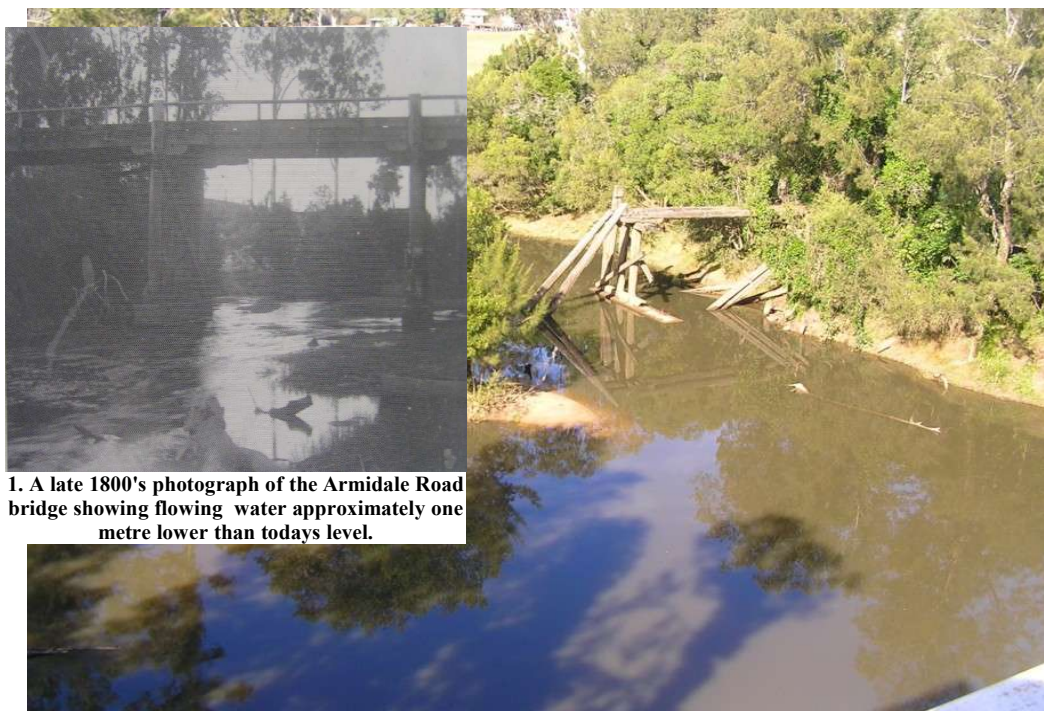
July 2007

A brief history

The ability of the Nymboida Power Station to generate electricity is directly linked to the amount of available water in the Nymboida River.

860 megalitres of water, which is diverted from a weir on the Nymboida River, are needed each day to run the plant at full capacity. After driving the turbines, that water is disgorged into Goolang Creek, and thence directly into the Clarence tidal pool via Blaxlands Creek and the Orara River. This diversion results in up to three times as much water flowing down Blaxlands Creek as is flowing down the lower Nymboida.

It is this robbing of up to 80% of the water from the Nymboida River that has attracted much criticism over the years. Apart from river flows below the Nymboida weir being reduced to the “very low flow” category for upwards of six months every year, Blaxlands Creek and the Orara River have suffered major erosion and degradation because of the unaccustomed amounts of water they have had to accommodate since the power station was opened in the 1920s. This degradation has been aided in part by poor agricultural practices in the past, clearing of creek banks and allowing stock to access the creek. Local landowners report that the Orara stream-bed has been raised by as much as three metres by silt deposits below the Blaxland Creek junction, which has also caused a lagoon effect by damming above the junction. This is clearly visible from the Armidale Road at Coutts Crossing.



1. A late 1800's photograph of the Armidale Road bridge showing flowing water approximately one metre lower than today's level.

2. The ruins of the old Armidale Road Bridge across the Orara River at Coutts Crossing. Today's ponding water differs from the free flowing water in the late 1800s (see inset). This is the direct result of siltation from Blaxlands Creek, a kilometre downstream.

In recent decades significant funding has been allocated to stream-bank stabilisation, and rehabilitation works. These efforts are ongoing and appear to be unending.

In the late 1990s, the Healthy Rivers Commission (HRC) determined that the Nymboida River should have a protected environmental flow of 225 megalitres per day. Until then, extractions for power generation were allowed to continue until daily flows in the Nymboida were reduced to as little as 12 megalitres, placing the river below the weir under extreme stress.

The 225ML environmental flow is set at the 95th percentile, otherwise described as “very low flow level” (the 95th percentile is the level of flow that is exceeded for 95% of the year on average).

With North Coast Water's construction of a pipeline connecting the Clarence to Karangi dam (2002), Coffs Harbour now draws all its water from the Nymboida River, lifting the

regional extractions to approximately 70 megalitres per day.

As a part of the Coffs-Clarence regional water supply scheme, a new 30,000 megalitre dam is currently under construction at Shannon Creek, which, when completed, will also be filled by water from the Nymboida River. This will increase extractions by a further 40 to 50 megalitres daily, up to the maximum 112ML/day allowable under North Coast Water's (NCW) licence.

It is expected to take up to three years to fill the dam, after which the river will be called on to maintain water levels in the dam to replace that used by the community, as well as unspecified amounts lost to evaporation, seepage and transpiration. This gives an equation where, for the power station to run at full capacity, there needs to be a flow in the Nymboida River of at least 1,197ML a day, comprising:

- ▶ 860ML/day for the power station,
- ▶ 50ML/day for community consumption,
- ▶ 62ML/day to fill the dam, and
- ▶ 225ML/day for the environmental flow.

Total - 1197ML/day

Any fall in flow below that 1,197ML/day will impact firstly on the power station. For example, when the dam is completed, and say the river flow drops to 500ML/day (as it has on the day of writing this article), NCW will continue to draw its 112ML, the environment will continue to enjoy its 225ML, which leaves just 163ML for the power station, or about 20% of its full capacity needs.

In the past Country Energy, which manages the station, has opted to use a strategy known as 'pulsing', which allowed the full daily water allocation to flow through the generators during periods of peak demand. This meant that by the above example Country Energy could either run the generators for eight hours straight, or in two four-hourly bursts.

This stop-start release of large volumes of water has been highly damaging to the downstream stream banks and the riparian zone generally, and has contributed to the need for the rehabilitation works. However, it is our understanding that pulsing is now no longer applied.

We have examined the Nymboida River flow records since 2000 and have turned up some interesting facts. Our analysis has been deliberately conservative as we do not know exactly how many hours the power station has operated, but, based on available water -

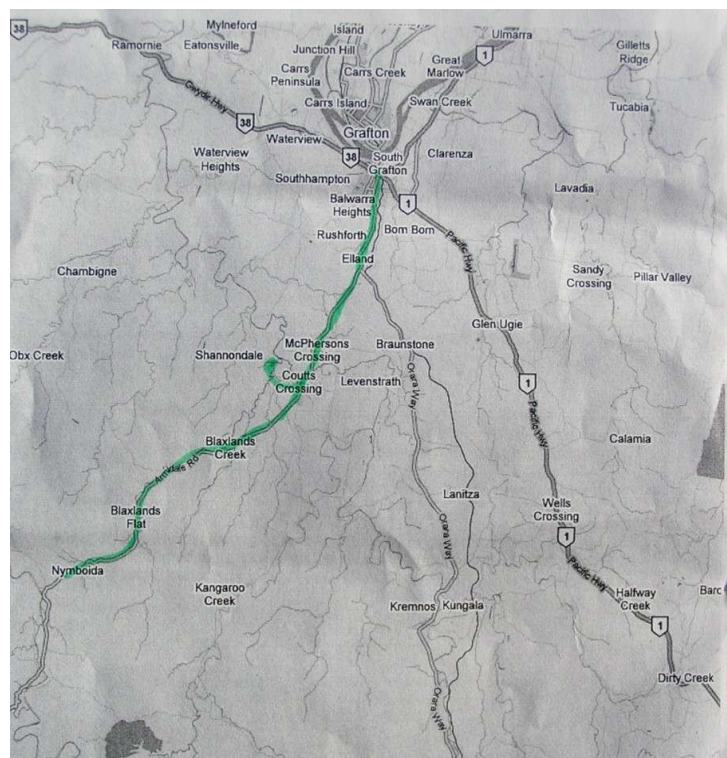
- 2000** would have seen full generation possible only on about 180 days (or half the year). Pulsing probably occurred during the rest of the year.
- 2001** was a very wet year due to a March flood. Even so, full generation would have been possible on less than 150 days, with pulsing likely occurring for much of the approximate remaining 215 days.
- 2002** was a drought year and a disaster for Country Energy. Full generation could have been maintained for only 13 days. Worse still, no power was generated for over 200 days when the station was closed down. This continued into -
- 2003** when the power station ran at less than full capacity for 310 days, including a complete shut down for more than 3 months.
- 2004** there were over 260 days when full generation wasn't possible, followed in
- 2005** with more than 290 days when less than full output was achieved.

* * *

Response and Consequence

On 4th July 2007, representatives of the Clarence Environment Centre and other conservation groups were invited by the Northern Rivers Catchment Management Authority (CMA) to join a field inspection of rehabilitation works on Blaxlands Creek near Coutts Crossing.

The CMA has joined with 22 landowners along the creek to form the Blaxlands Creek Rehabilitation Committee, which is currently undertaking works along 38 kilometres of creekline with help from EnviTE, and funding from the CMA and Country Energy.



3. Blaxlands Creek (marked in green) where the CMA is active.

To date Country Energy has contributed more than \$130,000, to which the CMA has provided an additional \$178,000 to assist landowners with fencing, targeted weed control programs, revegetation, and provision of off-stream watering points so cattle can be excluded from the riparian zone.



4. CMA photograph, Blaxlands Creek before rehabilitation



5. 18 months later, with structures in place

In-stream works include artificial rock and log structures put in place to interrupt flows, to produce riffles and form islands, with the aim of slowing erosion of the creek bed.



6. A 'manufactured' island, allowed to form naturally after placing posts in the river.

Unfortunately evidence of past erosion is clear all around. Anecdotal evidence provided by landowner Mr Ossie Ellis, is that when the power station was built, when he was a child of 13, the Blaxlands Creek bank-tops were less than 10 metres apart. Today the width between the banks is in the vicinity of 40 to 50 metres (see below). However, it is not just the banks that have been scoured. The creek-bed where the stream crosses the Orara flood plain has also been seriously eroded, and is now estimated to be at least three metres lower than it was 100 years ago.



7. The obvious degradation of Blaxlands Creek where the distance between bank-tops is now close to 50 metres. Anecdotal evidence suggests that distance was only 10 metres when the power station was built in 1924.

Ossie is well qualified to make this assessment. He has lived his entire life in the district and owns the property downstream from where the above works are being undertaken, land owned by his father and grandfather before him.

Major rehabilitation works were undertaken along the creek in the 1970s, but these have since been undercut by periodic floods, which have removed millions of tonnes of fragile alluvial sand from the Orara floodplain.

These earlier rehabilitation attempts involved railway line posts and steel cables, which are still in place. The photograph (right) shows one upright post to the left of the sheet of corrugated iron, now forming part of a fence across the creek. It was explained that the point where the wooden brace is attached to the steel post was the approximate level of the creek-bed when the works were undertaken.



8. Evidence of past erosion

This means the bed has eroded by at least 2 metres in the past three decades. It is hoped that the new works currently being undertaken will halt this trend by interrupting the sedimentary flows.

It has to be accepted that after 80 years of the power station's operation the ecology of Blaxlands Creek has been altered beyond the point of return. In this artificial environment certain other aquatic life forms have now evolved and adapted to the higher flows.

The local community too has adapted to the higher volumes of water. A world standard canoe slalom course has been operational on Goolang Creek for many years, attracting numbers of local and overseas competitors and visitors annually, while landowners downstream have acquired irrigation licenses and developed their properties to take full advantage of the increased water levels.

Implementation of the environmental flow in the Nymboida River, combined with a decade of lower than average rainfall, have forced longer 'down' times on the power station. The resultant likely stress to Blaxlands Creek by the fall in water flow has been addressed by the Department of Natural Resources, with provision made for the release of between 10 and 15ML of water a day to provide an environmental flow into the creek.

While the current rehabilitation program is showing promising results and must be applauded, there still could be a number of possible negative outcomes.

- ▶ Where cattle are excluded from damaged riparian areas, weeds are quick to establish. Not all landowners are enthusiastic. They blame the fencing policy for the weed infestations, and are reluctant to remove the weeds.
- ▶ Cattle may not be totally excluded. Fence-lines on either bank-top being as far as 60 metres apart means a considerable area of what graziers may see as 'wasted' land (see picture 7 above). Short periods of grazing will be seen as acceptable, or even beneficial. The concern we have is, will it be possible to prevent landowners from utilising that feed source, particularly in the event of a serious drought?
- ▶ Since the rehabilitation work has been undertaken no major flood has occurred. The structures now in place have yet to stand the test of the highly destructive forces that these events can unleash.
- ▶ Good work is being done to remove weeds, particularly Cat's Claw creeper. This highly invasive, and persistent weed requires continuous follow-up work if it is to be eliminated. But will funding be made available in the long term?
- ▶ There is a worrying level of River Oak deaths (*Casuarina cunninghamii* along the creek (picture 7 above). No investigation into the deaths has been undertaken. With no evidence of regeneration, and a water supply still present, suggestions that this is the result of either old-age or drought cannot be supported. It should be noted that the site of the regional water supply's dam at Shannon Creek has been contaminated with the die-back pathogen, *Phytophthora cinnamomi*. Heavy machinery is a major cause of the spread of this disease, and machinery that was used extensively at the contaminated site was also used to excavate a trench across Blaxlands Creek in 2002 for the Grafton to Coffs Harbour pipeline. As the proponent made no attempt to implement the recommendations of a *P. cinnamomi* Plan of Management to prevent spread of the disease, there is a possibility that the disease could have been transferred to Blaxlands Creek. This possibility should be investigated as a priority.

It is fair to say the community should be made aware of the level of environmental degradation that has resulted directly from the power station's operation, and the cost of necessary ongoing works to repair that damage, by the Catchment Management Authority and by volunteers such as Land Care.

The question that now must be asked is – is the power station an economically viable and ecologically sustainable proposition, given its inability to operate at more than 50% of capacity, and the ongoing costs of environmental work that is required?

* * *