

Submission
No 73

INQUIRY INTO WATER AUGMENTATION

Organisation: Orange Speleological Society

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ORANGE SPELEOLOGICAL SOCIETY'S SUBMISSION TO THE NSW LEGISLATIVE COUNCIL

A response to *points 1 b) and 1 f)*.

1. (b) ... *examine the suitability of future schemes for water storage ...*

1. (f) ... *examine social, economic and environmental aspects of water management practices in NSW and international jurisdictions ...*

The Proposed Dam on the Belubula River

The Orange Speleological Society is concerned with the proposal to dam the Belubula River in Central West NSW. The proposed dam sites at both Cranky Rock and The Needles Gap will adversely affect the environmental, geological and cultural heritage values of the Belubula River Valley, and specifically the Cliefden Caves area.

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'Cliefden karst area is of high significance due to its outstanding fossil deposits, abundance of karst features, extensive cave systems, diverse range of speleothems and cave fauna (i.e. bats and invertebrates). Collectively these values make Cliefden Caves an important site for education and scientific research.'

Construction of a dam on the Belubula will disadvantage local, national and international research. These caves are as important as the Age of Fishes Museum in Canowindra and the Wellington Caves.

Why Aren't These Caves Better Known?

The caves are well known, *nationally and internationally*, to the caving and scientific communities. *[Field trips, for example, will be conducted to the area in July 2017 for speleologists and scientists attending the World Speleological Congress (IUS) held in Penrith.]* However, because the caves are on private land, owners have insurance and trespass concerns and do not encourage their advertising or promotion. Many local people know of the caves and, over the years, have been guided through them. OSS and the landowners are anxious that the caves, in pristine condition, continue to be treated with care.

OSS is opposed to the construction of a new dam on the Belubula River for the following reasons:

1. Geological and engineering limitations of The Needles and Cranky Rock dam sites

- There have been numerous plans for building a dam on the lower reaches of the Belubula River, upstream of Canowindra over at least the last 80 years. The engineering criteria have been unfavourable and projects have been abandoned before the detailed design stage was reached on each occasion.
- Bedrock conditions of the dam sites have been found to be unsuitable. This area has a variety of sandstones and shales present. A 25m thick shale band is present in the base of the gorge that would cause major design problems. The differential behaviour of the shales and sandstones would place substantial stress on a dam and likely lead to failure.

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- There are a number of dams already in this catchment, including Carcoar Dam, Lake Rowlands Dam, Cadiangullong Dam and Rodds Creek Dam. Much of the catchment is already dammed.
- The Belubula River is a small river system. Another dam high up in this catchment significantly reduces the catchment area to the point that this site is not viable.
- Much of the flows to The Needles Gap in summer are derived from the regulated releases from Carcoar Dam.

- Mean annual rainfall at Mandurama is 781 mm/year, but evaporation is around 1400 mm/year. As such, storing water in shallow, high surface-area reservoirs will result in significant water losses in the Belubula River valley and downstream system, especially during the summer months.

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- Existing upstream licences (High and General Security), funded through regulated releases from Carcoar Dam (which will be locked up for urban and domestic water supply under the proposal), will be impacted.
- Cadia Valley Operations own High Security licences together with a High Flow licence and would have to develop alternative extraction points with associated infrastructure.
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Scientific importance and research potential

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abundant examples of some of the earliest shell beds in the geological record and the earliest rugose corals known.

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- The caves are excellent examples of hypogene caves (caves formed beneath the earth's surface by ascending thermal water).
- The caves contain abundant and varied examples of speleothems (cave formations) including helictites and rare blue stalactites and stalagmites.
- Considered management of visitors means that this is one of the best protected caving areas in the state.
- The proposed dam will inundate all the major caves on the Belubula River. Where there are entrances above the proposed top water level, the lower parts of the cave will still be flooded.

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- Tufa barrages – Davys Creek is the largest and most extensive tufa depositing watercourse in NSW.
- Warm Spring – Cliefden has one of only three karst related warm springs in NSW (approx. 390m ASL).

8. Threatened species: Bats

Eastern Bentwing Bat (*Miniopterus schreibersii*)

- The Eastern Bentwing Bat is listed as **Vulnerable** under the NSW TSC Act (1995). The Cliefden Caves provide year round roosts as well as a major overwintering roost.

Eastern Horseshoe bat (*Rhinolophus megaphyllus*)

- The colony of the Eastern Horseshoe-bat at Cliefden Caves is probably the westernmost occurrence of this species in the state and is therefore regionally vulnerable.

The colony utilises one of the caves as a maternity roost.

Their special roosting requirements are the limiting factor in their distribution. In addition they have a high degree of roost fidelity and do not travel far from the roost. The colony has already lost an alternative habitat due to mining operations elsewhere in the region.

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- At least one troglobitic (having adaptations for living within caves, and only found in caves) species of Harvestman (*Icona* sp.) is found there.
- Several troglophilic (don't have adaptations for living in caves, but only found in caves) species of cave invertebrates are found there.
- At least one stygobiont (aquatic cave dwelling invertebrate) is present.

10. Heritage sites: Aboriginal and European

- One of the caves is known to contain Aboriginal skeletal remains.
- Aboriginal scar trees have been reported in the area.
- Historic "Cliefden Springs" ruins are located on Davys Flat and date from the early to mid 1800s.
- Historic graffiti in caves dates from the early 1840s.

11. Loss of productive agricultural land

- Productive agricultural land upstream of the dam site will be lost by flooding.
- Replacement by newly productive (irrigated) land downstream provides no net gain in agricultural productivity and does not appear to be economically worthwhile.

Are there Alternatives to a Dam?

Research clearly reveals that building dams to store water is an old, inefficient technology. It is, however, a simple idea to grasp. As such it is a popular call for politicians under political pressure.

Water needs to be used differently. For example:

- Move from flood irrigation to other methods.
- Recycle water more widely and efficiently.
- Employ greater efficiencies.
- Reduce demands for water.

The cost of a new dam on the Belubula will be several hundred million dollars, possibly closer to a billion dollars. (Refer Water NSW figures.) If it is jointly government and privately funded, as proposed, then whoever owns the dam will own the water and determine its cost. What private water user/s in the Central West or downstream could afford this cost? The answer is mining companies. Should new mines be opened up water will not be released for users downstream nor to replenish the swamps and wetlands further down the Lachlan.

In summary, what will be lost if a dam on the Belubula is built?

- Highly decorated cave systems, including rare blue stalactite formations.
- Caves. Once flooded, they will be silted up and destroyed.
- World renowned fossil sites. Fossil Hill, Trilobite Hill and highly fossiliferous Cliefden limestone will be inundated.
- An Important National Geoheritage site. Cliefden is the site of the first Ordovician limestone found in NSW. It contains examples of some of the earliest shell beds in the geological record and earliest known rugose corals.
- The hot spring - one of only three on karst (limestone) in NSW.
- The rare tufa dams (calcite dams) on Davys Creek.
- Cultural heritage sites - indigenous and early colonial.
- An important scientific research site for universities, scientists and local schools. (More than 50 scientific papers have been published on this area and the caves. Two academic studies (on bats & geomorphology) are currently in progress.
- The best climate-study site west of the Blue Mountains.
- Endangered bat species habitat and bat maternity sites.
- Large areas of productive river flat agricultural land of high value on several properties.
- A significant area of remnant riparian vegetation and wildlife corridor in an otherwise cleared landscape.
- A number of threatened and/or endemic invertebrate species and their habitat.

Recent Studies of the Cliefden Caves and Karst Area

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'The expectation of global change and the uncertainty of the response of environmental systems to such a change, is cause for much concern ...To assess impacts of future climatic change and to devise strategies to cope with such change, it is necessary to understand the response of terrestrial, oceanic and atmospheric systems to past climate change ... To understand ENSO (El Nino/ Southern Oscillation) variability - long term paleoenvironmental records are essential.'

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