A Dam On The Clarence River

To Dam or not to Dam
It is a question, which needs to be debated?

Following are observations on the North Coast Draft Regional Water Strategy Reports:

Subtitle: North Coast: Strategy, March 2021 Dept ref no: PUB20/309, (174 Pages)
Subtitle: North Coast: Long list of options, March 2021, Dept ref no: PUB20/310, (64 Pages)

Access Information:

https://www.dpie.nsw.gov.au/north-coast-regional-water-strategy
Regional Water Strategies Guide (PDF 3.5 MB)
Draft North Coast Region Water Strategy (PDF 9.8 MB)
Draft North Coast-long list of options (PDF 3.6 MB)

You too can have your say until 21-4-21:

Web: www.dpie.nsw.gov.au/north coast-regional-water-strategy
Email: regionalwater.strategies@dpie.nsw.gov.au

"Please note that all submissions will be published on the department's website unless you let us know in your submission that you do not wish the content to be released."

Preamble:

Many years ago, my geography teacher told us the best place in Australia to live was the NE corner of NSW.

Its only natural negative seemed to be what happens when it rains too much. And looking at all the natural factors, which justify that remark, he was correct. Which is the best of the best catchments though, is a moot point, they all have pluses and minuses.,

In the case of the Clarence, a negative is the shape of its catchment. It is like a large wrinkled bathtub, and when it rains the water careens down the slopes and rushes out to sea. From a little to a lot and back again. If there is too much rain it results in damaging deluges across the delta, with short- and long-term negative effects.

And Since 1839 there has been a flood event every 1.5 years so it is not as though they are a rarity.

Based on the historic volumes and longevity of the rain events, it is possible to control the damage that each one causes. For the Clarence this can be achieved with a dam, whose primary function would be for flood mitigation. (Taming the Orara is a separate problem to be addressed.)

Over the years there have been a number of proposals for building mini-Snowy schemes across the catchment, whose function would be to water the west. For numerous reasonable reasons none were viable nor acceptable.

Sir Earle Page put forward a sensible single dam proposal, whose function would be to provide a source of electric power between Sydney and Brisbane. Progress soon made it unnecessary.

There has been a vibrant anti-dam movement in the Clarence, which was highlighted by the Not A Drop campaign. This was understandable for the mini-Snowy proposals, but it has become an anti-any-dam movement.

It started out as a NOOMBY (Not Out Of My Back Yard), which was sensible but selfish, to being a NIMBY (Not In My Back Yard), which is more a case of shooting ourselves in the foot.

It has got to the point of being so irrational that the palindrome of dam and mad would seem to be quite appropriate.

Is that a bit harsh? Based on the anti-dam alternatives, which have already been implemented or planned it would seem to be justified. Read on.

The North Coast Draft Regional Water Strategy Reports.

The strategy of what happens in the North Coast areas, and particularly the Clarence catchment is being determined by the State Government. Effectively it takes the Not-A-Drop and Not-A-Dam ideals and sets out what this will really mean for life in the Clarence.

The Clarence River is the giver (its water), and the taker (its floods), of this paradise, yet dealing with this truism in the reports is ignored.

The above documents suggest we to go out and get our food from a dumpster and our water from the sewer or the sea, while paying homage to the untouchable river. This is not acceptable.

The Strategy's Vision:

"Our vision for the strategy is to support the delivery of healthy, reliable and resilient water resources for a liveable and prosperous North Coast region. To achieve this, we need to position the region so there is the right amount of water of the right quality delivered in the right way for people, Aboriginal communities, towns, industries and the environment.

Reads like a grand plan, but then it gets qualified a little:

The current long list of options focuses on:

Maintaining and diversifying water	(But not from our rivers!)
Protecting and enhancing natural systems	(which means?)
Supporting water use efficiency and conservation."	(By reusing "used" water or seawater,)

Examples:

Water for you, me and our way of life:

1. "*Investigate the opportunity to discharge highly purified wastewater into existing council storages to reduce council demand on river and groundwater extraction.*

Highly treated wastewater from sewage treatment plants has the potential to be a reliable, safe and mostly climate-independent water source. The levels of treatment required depend on whether the water will be stored or conveyed by rivers or groundwater, and what the end uses are. Water for drinking requires higher levels of treatment and purification than water used by agriculture and industry. ***For the North Coast region, the adoption of indirect potable reuse would involve augmenting drinking water supplies through discharging purified wastewater either upstream of the town extraction point or directly into the town storage."***

2. *"Investigate installing fixed or portable desalination plants just above the high tide level."*

Think about it: The volume of Shannon Dam (30GL), goes out to sea at Yamba every week and yet is taboo to take any water out of the river. As a result of this imposition, it is recommended that:

Sewerage (which maybe contaminated with God knows what), could be de-putrefied and bottled.

Sea water (which maybe contaminated with flood water), is desalinated using lots of electricity, into potable fresh water. But for the Northern Rivers "just above high tide level, is not even "possible" because some 90% of the coastline is National Parks, and they won't even allow available town water to go to their "natural" campgrounds, or provide water for their native inhabitants.

And the strategy and the options exclude floods, as though they don't exist or have an impact! But they do and they are made worse by the Clarence's bathtub geography.

Floods:

It seems that floods have been occurring since day dot, and they will continue to do so.

Since 1839 there have been 121 Clarence River floods, (compared to 41 in Kempsey), or one flood every 1.5 years. Hence flooding cannot be considered a rare and unusual occurrence.
In the last 11 years there have been three major floods (2011, 13, 21), and a few minor ones.

The disruption, the cost, the hardship created by these have a significant impact on the current and future liveability and viability of the Clarence, and it seems we need to just learn to live with them.

The reports tells us it is all under control if our councils "*Improve flood management for regional towns and communities*". They then tell our councils how to achieve this as set out on Page 87:
"...It identifies that local councils are primarily responsible for managing flood risk in their communities, and their responsibilities include":

Developing and implementing floodplain risk management plans to better understand and manage flood risk to the community

Providing information to, and improving the awareness of flooding in, the community

Operating and maintaining their floodplain risk management assets (for example, drainage and levees)

Consider flooding in development and infrastructure decisions

Supporting NSW SES in emergency management and associated planning."

Or putting it another way: Flood mitigation dams won't be allowed to be built, but councils are responsible for the impact of the floods. Talk about passing the bucket. Apart from which, it seems difficult to imagine how plans, awareness, and a few drains will actually, hold back the water.

Why not? Let's look at the power of the current flood:

	Saturday		Friday		Thursday		Wednesday		Tuesday		Monday		Sunday			
	27-Mar-21		26-Mar-21		25-Mar-21		24-Mar-21		23-Mar-21		22-Mar-21		21-Mar-21		Av Flow /Day	Weekly Total
	Level (m)	Flow (ML/day)	Level (m)	Flow (ML/day)	Level (m)	Flow (ML/day)	Level (m)	Flow (ML/day)	Level (m)	Flow (ML/day)	Level (m)	Flow (ML/day)	Level (m)	Flow (ML/day)		
MARYLAND D/S WYLIE C (204039)	1.36	750	1.58	1,099	2	2,108	3.61	**10,473**	2.05	2,235	0.59	65	0.64	92	2,403	16,822
CATARACT @SANDY HILL (204036)	2	2,533	2.08	2,951	2.28	4,041	3.09	9,170	3.61	**13,573**	1.92	2,197	1.89	2,057	5,217	36,522
CLARENCE PADDYS FLAT (204051)	3.01	8,565	3.41	12,443	4.65	26,593	7.97	**94,216**	6.41	56,276	2.2	3,822	2.32	4,363	29,468	206,278
CLARENCE @ TABULAM (204002)	2.57	10,643	3.55	19,309	5.85	71,011	9.85	**266,631**	6.71	100,743	1.79	5,616	2.03	7,029	68,712	480,982
TIMBARRA BILLYRIMBAH (204033)	1.18	2,680	1.4	4,095	1.87	8,144	3.42	27,943	3.47	28,619	1.29	3,334	0.88	1,326	10,877	76,141
TIMBARRA @ DRAKE (204046)	1.88	6,942	2.04	10,520	2.36	18,608	3.56	**65,781**	3.17	47,241	1.85	6,508	1.68	3,815	22,774	159,415
CLARENCE @ BARYULGIL (204900)	3.79	28,983	4.78	54,944	7.26	158,592	11.01	**426,763**	7.26	158,972	3.67	26,299	3.42	21,544	125,157	876,097
MANN @ SHANNON VALE (204031)	0.88	327	1.11	569	1.57	1,528	5	18,536	0.34	38	0.29	26	0.31	31	3,008	21,055
MANN @ MITCHELL (204014)	1.19	1,536	1.28	2,204	1.54	5,212	2.55	**31,227**	1.33	2,663	0.83	281	0.78	207	6,190	43,330
NYMBOIDA @ NYMBOIDA (204001)	2.89	12,675	3.3	16,854	3.96	25,002	6.05	**63,369**	6.4	72,086	7.56	106,939	3.35	17,397	44,903	314,322
NYMBOIDA D/S WEIR (204069)	3.47	14,663	3.95	20,504	4.83	32,795	7.44	82,298	7.77	89,921	8.41	**105,933**	3.44	14,407	51,503	360,521
MANN @ JACKADGERY (204004) XXX	2.67	33,296	3.21	55,503	4.65	135,852	7.11	**329,129**	6.46	271,416	3.85	86,586	2.56	29,265	134,435	941,047 X
CLARENCE @ LILYDALE (204007) XXX	4.62	77,930	6.42	139,264	11.1	413,822	14	675,197	11.11	414,620	5.5	105,949	3.84	55,463	268,892	1,882,245 X
ORARA @ ORANGE GROVE (204068)	2.39	1,129	2.5	1,481	2.7	2,195	3.22	4,348	3.72	6,797	4.97	20,008	3.1	3,794	5,679	39,752
ORARA @ KARANGI (204025)	1.41	1,234	1.5	1,742	1.66	2,763	1.98	4,950	2.26	7,276	3.46	18,413	1.94	4,715	5,870	41,093
ORARA R @ GLENREAGH (204906)	2.19	2,846	2.66	3,900	3.72	6,986	7	22,114	9.35	43,911	9.57	**46,989**	4.13	8,519	19,324	135,265
ORARA @ BAWDEN BDGE (204041) XXX	8.14	29,997	12.58	64,962	17.42	119,983	19.12	143,167	15.66	98,198	11.32	53,280	8.17	30,140	77,104	539,727 X
GRAFTON (204400)	2.35	-	3.73	-	**6.11**	-	5.99	-	3.39	-	1.22	-	1.09	-	0	0
ROGANS BRIDGE (204413)	3	-	5.05	-	9.22	-	**10.14**	-	6.7	-	2.32	-	1.69	-	0	0
	27-Mar-21		26-Mar-21		25-Mar-21		24-Mar-21		23-Mar-21		22-Mar-21		21-Mar-21		Av Flow /Day	Weekly Total
	Saturday		Friday		Thursday		Wednesday		Tuesday		Monday		Sunday			

The table shows the major Clarence Catchment river volumes from 21-3-21 through 27-3-21 and the huge volumes of water, which came and went during that week.

Using the pertinent figures from the table flood water enters the estuary from two main sources; the Clarence after amalgamating the water from all its tributaries just above Lilydale, and the Orara River, which flows directly into the estuary.

Wednesday 24-Mar-21	Level (m)	Flow (ML/day)
CLARENCE @ TABULAM (204002)	9.85	266,631
TIMBARRA @ DRAKE (204046)	3.56	65,781
CLARENCE @ BARYULGIL (204900)	11.01	426,763
NYMBOIDA D/S WEIR (204069)	7.44	82,298
MANN @ JACKADGERY (204004) XXX	7.11	329,129
CLARENCE @ LILYDALE (204007) XXX	14	675,197
ORARA @ BAWDEN BDGE (204041) XXX	19.12	143,167
ORARA + CLARENCE		818,364

And 24-Mar-21 was a doozy of a day.
Putting the Orara + Clarence into perspective:

On 24/3/21, (the same day as the cancelled meeting!) 675,197Ml from the Clarence and 143,167Ml from the Orara, for a total of **818,364Ml or 818Gl**, gushed into the estuary. This was equal to a quarter of the Clarence's last year's total flow!

It's also equal to 27 times the capacity of Shannon Dam or 327,200 2.5Ml Olympic pools, which is 234 pools/minute.
And remember that was all in one day.

Without a dam able to absorb at least 1,000Gl, then these floods will keep occurring.

The doco also suggested levees but they can do more harm than good: This is because, if for example Grafton's levees were upsized, it just means that downstream communities receive a larger flood.

So, what needs to be done?

The folks involved with this strategy need to go back to square one and come up with a new vision, which is:

How do we wisely control, manage and utilise the Clarence Catchment rivers, for both mankind and the environment?

Background:

A public meeting was to be held on 24-03-21 to allow discussion on the "*Options for the Draft North Coast Regional Water Strategy*".

They are significant documents, but they ignore discussing a cross-river dam.

In some catchments flood mitigation dams are not necessary, but this is not the case for the Clarence.

They also made it clear that dams were a no-no after earlier meetings: "*The only item not progressed was a Clarence River Dam to supply the entire NE NSW area*". (It was to be upstream from Duck Creek, which was a non-viable option anyway).

Shannon Creek Dam was mentioned but it is not a cross river dam and is not capable of supporting our future water and mitigation requirements.

Then Huey (the Weather God), stepped in and gave us a doozie of a flood. (Thanks Huey.) It was poetic justice and so appropriate, when the 24-03-21 meeting was postponed due to flooding.

There are 5 main functions for a dam:
Water Supply, Flood Mitigation, power-generation, recreation and the environment.

Some dams try to provide the conflicting requirements of Water Supply and Flood Mitigation. Warragamba (Sydney) and Wivenhoe (Brisbane) are examples of trying to do both and it doesn't work very well.

The Gorge Dam would be able to handle this conflict due to its geography and low water supply requirements.

It would not be suitable for power generation.

Family friendly fresh lake water recreation could become a major activity. One reason for this is that fresh water recreation areas, east of the ranges in NSW are a rarity. (Many visitors prefer fresh water to the sea. Townsville's Ross River Dam surprisingly, attracts more visitors than the famous Magnetic Island.)

There were some appropriate suggestions put forward in the documents, but the need,

"To control the flow of a river during a flood event" was ignored.

Why is a dam the only solution for minimising floods in the Clarence?

The 22,716sqkm Clarence catchment is like a large cistern. It's enclosed, it has steep sides and the water from the two main rivers, the Clarence and the Orara flow into the Clarence estuary, in a very short time span.

When it rains the water rushes downhill from river to river until they eventually all come together when the Mann and the Clarence merge near Lilydale.

Based on 5 years (over 7 years), of daily figures the daily flows at Lilydale have varied from 11Ml to 675,000 Ml., a ratio of 1/61,000. Even when comparing the highest 3 months of 5,230,000Ml compared to the lowest 3 months of 3,000ML, still gives a differential 1/1,750. That's erratic.

Note: The Orara River is not part of the Clarence River as it flows directly into the Clarence Estuary, but it is part of the catchment and what its future should be, needs to be evaluated.

Putting that into perspective:
As outlined earlier on Wednesday 24/3/21 over 800GL gushed into the estuary. in one day.

As a result: Two major communities, Yamba an Iluka were isolated for days and all the river-side communities were flooded. And the Clarence ferries didn't run for a week.

Many major roads were closed and damaged, with most of the damage resulting from the flooding not the rain. Schools and businesses closed. Buildings were inundated. Treasures and memories were lost.

It would seem that 3 major floods and some minor ones in 11 years, should create some interest in flood mitigation. It's not as though they're a rare occurrence.

And flood mitigation is more than paperwork, plans and a levee or two; it requires a mitigation dam.

But no:
It seems like the responsible departments determining what is needed for our communities either don't understand or don't care as long as the rivers are left untouched.

Why only One Dam?

Over time there have been proposals to build a multi-dam with tunnels and viaducts across the catchment. They all seem to be a grandiose version of the Snowy Mountains scheme. None of them would have worked.

After pouring through river flows and contours, it appeared that the only viable place for a dam, which would allow control of the water flowing on to the flood plain, was just above The Gorge. It must have been a good guess as I then found that Sir Earle Page's proposal, was for a dam in the same spot.

Pro's and Con's:

It is the best (only) place on the catchment where enough water consistently flows, to support a dam.

It is only 30km from the estuary and has little, if any effect on upstream tributaries and the real wild rivers we are so proud of.

Once filled to an everyday level (one large rain event), current flows into the estuary would continue.

Based on historic water flows during large rain events, it would flood proof the lower Clarence. The importance and positive outcomes of this are significant and should not be underestimated.

"But the delta needs floods to replenish the soils!" This is no longer the case. Modern farming techniques do a better job. Also, as communities expand more damage occurs, and the amounts of toxic stuff, washed out to sea is unacceptable. This is validated by Yamba having to close its beaches due to contamination from flood waters.

Is this correct? Just a day ago Environmental officials verified this was correct. "Environmental officials have warned that the recent floods have had a "significant impact" on water quality, and there could be heavy contamination in the ocean. The heavy rain and floodwaters will have washed pollutants from our streets, including rubbish, bird and dog faeces, cigarette butts, leaf litter and oil into the stormwater system."

It would ensure that there would be a more even flow of fresh water into the estuary to add to the Orara's erratic, 250Gl/yr contribution.

It would minimise or eliminate flood insurance levies.

It would allow flood prone land, which is currently not used, to be developed for housing, industries and farming. This would apply to all estuarine communities, many of who are already short of developable land.

The lake above the dam would become a major fresh water recreation area, one of the few in coastal NSW. (Townsville's Ross River Dam surprisingly, attracts more visitors than the famous Magnetic Island.)

It would negate the need for plastic water tanks, weighing up to 400kg which can take up a lot of a small back yard, and reduce building costs, (a 10,000L tank and pump installed could cost $5,000 +/-).

The photos show the damned water-tank-I-don't-need, which blocks the view from my living room. The bottom photo shows the electric pump needed to pressurise the water coming out.

And with dam water, at least in this area, their water would not be needed.

Not only is it a disgusting eyesore, but it is an environmental disaster, both from a visual and an environmental view point.

It has been pointed over many years that water tanks become breeding grounds for mosquitos. I call the tanks MOZTELs. (They may stay mozzie proof for a while but not forever.) They indicate that tanks are mainly responsible for their move south and the diseases they spread.

Fish habit for the eastern cod and other fish would be improved, particularly during droughts.

For fish, which migrate from salt to fresh to salt, fish ladders would be built.

Cost: Compared to the benefits, both short and long term, the costs would be covered.

As the floods inundated the state from end to end in the last few weeks the flood insurers indicated they will consider not providing flood coverage or raising the cost of insurance significantly. Even the PM suggested that that building on flood plains should be prohibited. With the mitigation dam, flood prone areas would diminish significantly, as would the cost and the heartaches associated with floods.

Dam Con's:

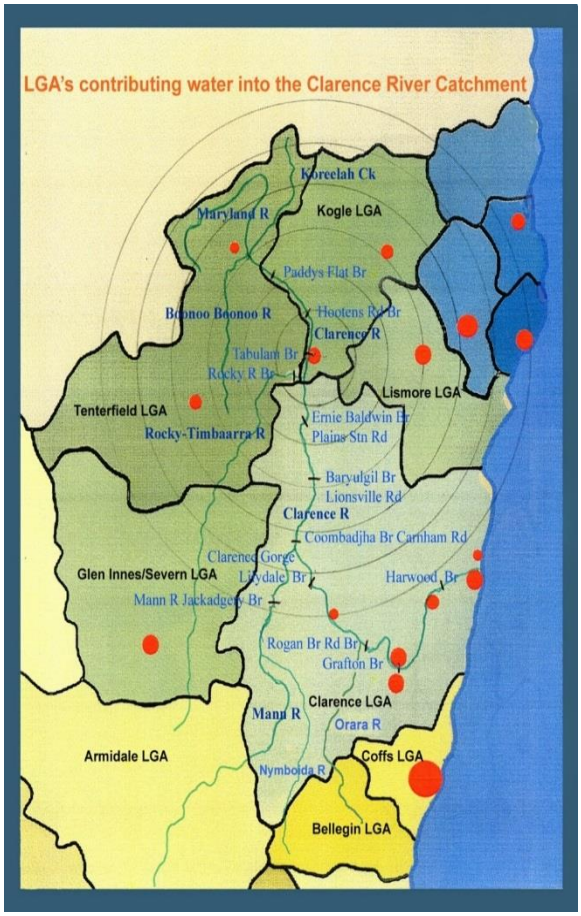
As well as the cost and maintenance of the dam and its infrastructure there would need to be a review/rebuild of the current upstream roads and bridges.

Farmers and others who currently own or use the land down to the river's current confines, would need to be compensated. although the lake would provide other opportunities for them.

People who like having "exclusive" use of this part of the river, will have a hissy fit, but so be it.

The following is considered a Con but it is really a Pro:

Water Sharing:



Northern Rivers LGA map.

This could be achieved without any noticeable impact on the CLCA, except for residential blood pressure.

Many locals consider it as "Our Water". It's not. About 50% of the water reaching the estuary enters the system in other LGAs.

From the North, most of the Clarence's water comes from north of the Rocky-Timbarra River and is outside of the Clarence LGA. Likewise, for those coming from the South much of the input is from other LGA's.

Also, the Clarence River legally ends just NW of Copmanhurst, where it meets the sea. There is no harm in calling it the Mighty Clarence River, but in reality, it is an estuary and the real river is quite different. Most of the time it not very mighty. They don't call Port Phillip "The Mighty Yarra" or Sydney Harbour part of the Paramatta River. This is quite irrelevant, but is a point to ponder.

Back to water sharing…

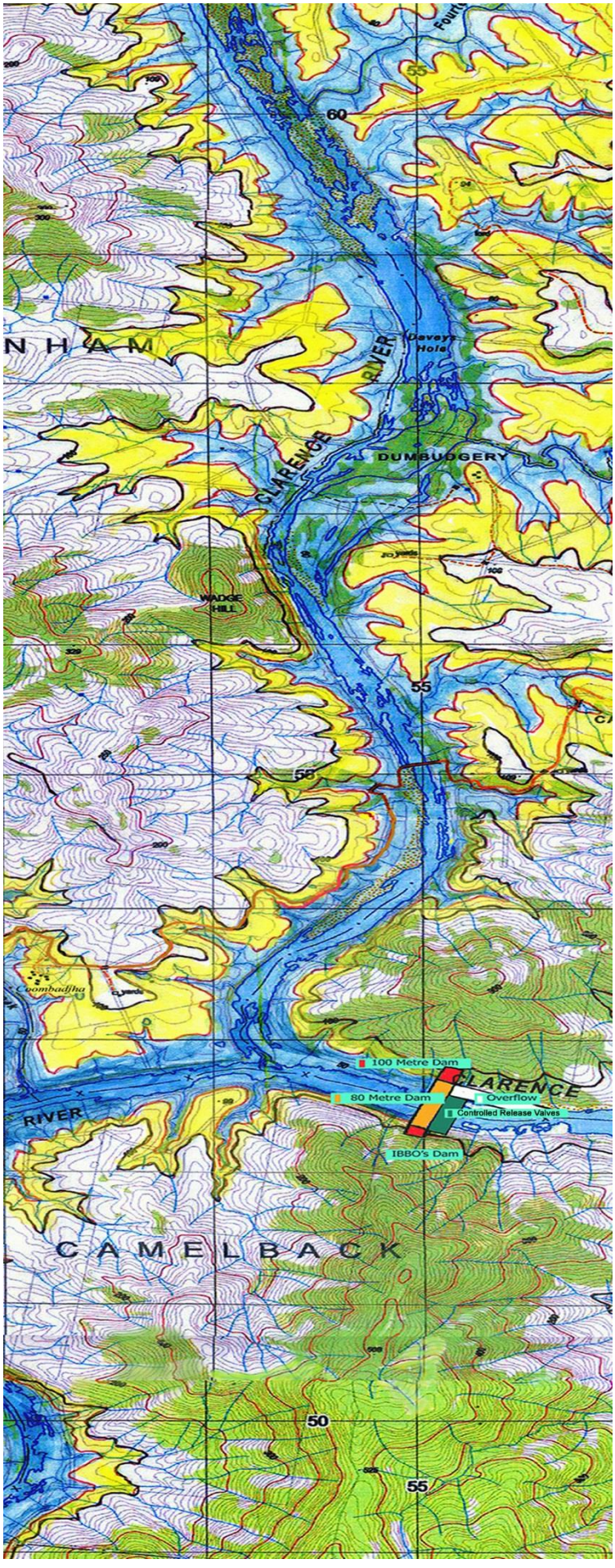
The proposed water sharing would only involve pumping up to 200ML/day, which although it is 20X the volume of domestic water used in the CLGA, it is only 5% of the water passing through Lilydale or 10% of what flowed out to sea on 24/3/21!

Water could be pumped up to the top of the range from the proposed dam. It would require a 70km pipeline, with a lift of 1,050m going into a small holding dam on Kneipps Creek.

Based on other pipelines lifting 200Ml of water/day could be done with a single pump station. The pumping operation costs would be paid for by the end users. The water would then be dispersed through pipelines to western slopes communities for non-agricultural use. None would be released into the westward flowing rivers.
At 200Ml/day (73Gl/yr), it would only be 2% of an annual average flow at Lilydale of 4,300Gl.

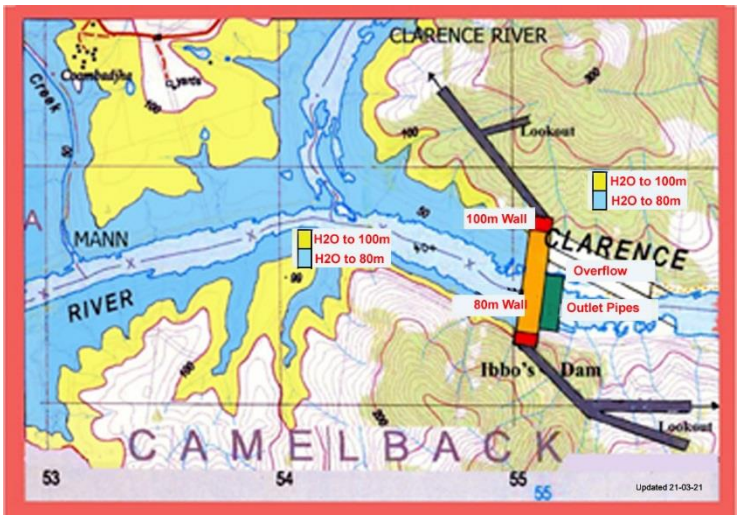
It could be called **The Clarence Water Web**

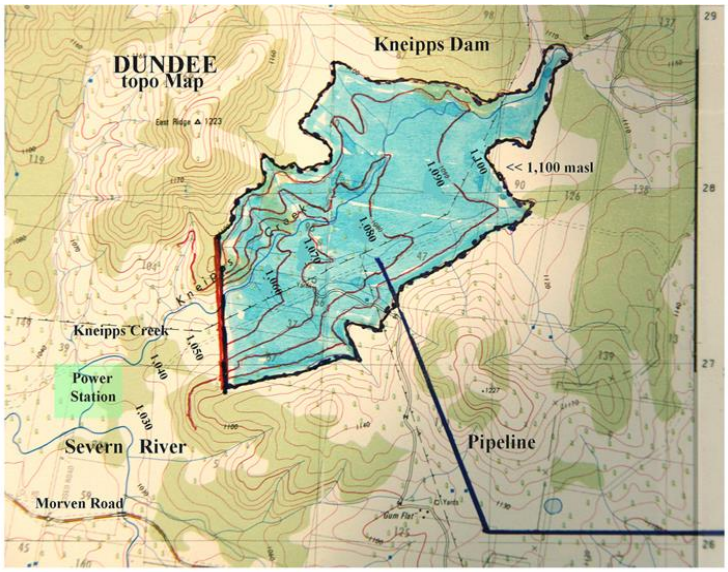
The Clarence River Dam between the confluence of the Mann and Clarence Rivers and The Gorge (circa 2010).



Maps of Clarence Gorge Dam

(overall and Close up)





Map of Kneipps Dam

The dam would be at the 50m contour with a wall height of 50m (?). Based on volume and area calculations done by a hydraulics engineer it was possible to calculate the water volumes, which the dam would hold.

Capacity of a	**Clarence River**	**Dam above Gorge**
Water Level (m AHD)	Lake Surface Area (sq Kms)	Cumulative Volume (GL)
50	0	0
60	5.1	36
70	20.3	153
80	40	454
90	70.1	1,004
100	129.4	2000

Water could be gravity piped to the delta. It would provide additional fresh water for Northern River communities, horticulture, without adversely affecting the tourism and flood mitigation and would reduce the pressure on the Nymboida/Shannon Dam facility.

It could also be used to supplement the water supplies of Casino, Lismore, Ballina and communities to the south. It would also negate the need for desalination or unnecessary recycling of waste water, except for farming as they do in Werribee in Victoria.

And after providing all of the benefits outlined here it would still allow 70%+% of the Clarence's water to just pass in controlled manner, through the CLGA on its way to the sea.

© Cartoon by Cartoonist (Steve Hunter) and the Carbon Sense Coalition www.carbon-sense.com

Thank you for the opportunity to submit my recommendations for water management in the NSWs Northern Rivers area. I would be delighted to discuss them further if asked.

[redacted]

The Clarence Water Web