

From: [NSW Government](#)
To: [Flood Inquiry](#)
Subject: Floods Inquiry
Date: Friday, 20 May 2022 7:37:19 AM
Attachments: [CV 22 04 28.pdf](#)
[DD comments 22 05 03.pdf](#)

Your details

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Submission details

I am making this submission as	An academic/researcher
Submission type	I am making a personal submission
Your position in the organisation (if applicable)	resident; flood hydrologist; Byron Shire Councillor
Consent to make submission public	I give my consent for this submission to be made public

Share your experience or tell your story

Your story	I reside and have done for 28 years in Main Arm just west of Mullumbimby, 200m above sea level. I watch the Brunswick Valley from home where I
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was isolated by flooding of and damage to the road network for several days from 27 February 2022. I have previously resided in the town of Lismore and worked in its CBD for a decade or so 1990s to 2000s.

I am a flood hydrologist with five decades of experience in river gauging, flood analysis and floodplain management throughout NSW. I attach my CV.

I also attach a short document with a series of observations on the 2022 events.

In Byron Shire, where I am also a Shire Councillor, there were two distinct events: a classic flood that peaked in Mullumbimby on 28 February and was driven by rain in the Shire's hinterland; and urban flooding a month later, driven by rain on the coast itself.

I choose to submit my comments as one document, as attached. I trust the Inquiry will sort them geographically and into its own series of matters defined in its Terms or Reference.

Thank you for undertaking this Inquiry.

Please see that the incredible volunteers who emerged from the devastation in every location to serve their community received at least a thank you, if not compensation for their time (in the way that RFS volunteers are now remunerated).

Please also recognise that situations in each locality of the northern rivers were different. The town of Lismore was worst hit, because of population numbers and of the height by which the 1-in-100-year flood was exceeded. Byron Shire's various floods caused devastation and the town of Mullumbimby for example has options for its future that are different from Lismore's.

In addition, Byron Shire's hinterland is still devastated. Some residents still have no road access or communications.

I attended your Inquiry session in Tumbulgum on 4 May and was disappointed to have the microphone holder determine that I could not address the Inquiry as I was out-of-Shire. Please visit this Shire to listen to us.

Terms of Reference (optional)

The Inquiry welcomes submissions that address the particular matters identified in its [Terms of Reference](#)

Supporting documents or images

Attach files

- [CV 22 04 28.pdf](#)
 - [DD comments 22 05 03.pdf](#)
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Duncan: some comments on February / March 2022 flooding in our region:

1. Lismore and areas west from Byron Shire:

The price of the early March flood has been high - we must recognise the death, destruction, loss and ongoing suffering. We must also recognise the sometimes heroic assistance given, mostly by volunteers. There is a state Flood Inquiry that I hope will examine several factors for the Wilsons & Richmond Valleys, including:

- (i) the rarity of rainfalls and the proportion attributable to climate change. These questions in relation to flood levels can't yet be answered - that will be later this century. For rainfalls however, there is enough science to declare the change due to climate change. IPCC tells us that for each degree of air warming, the sky carries an extra 7% of moisture (rain).
- (ii) the hydraulic impact of development on the floodplain, as would impede flood flows. Major recent developments include the levee in Lismore, fill on the floodplain out towards its airport, and the M1 motorway lower in the floodplain (from about Teven to about New Italy).

The peak 2022 water level in Lismore was 2.0m (almost one house storey) higher than the predicted 1-in-100-year level of 12.38m. The highest measured in the last 150 years was 12.11m, in both 1954 and 1974.

Lismore was 'ordered' after the 1974 flood to relocate to high ground (Goonellabah). That initiative was resisted including the removal of the plaques on power poles that marked that flood level, which was already well into second storeys of CBD buildings. The ultimate resistance was the building of the levee known to some as The Lemon. It was designed to keep out 1-in-10-year floods. One of its impacts was complacency towards flooding. It decreased frequency of flooding down to only the severe floods.

2. language:

It is a fundamental premise of traditional flood hydrology that the "1-in-XX-year" flood is the highest level experienced divided (approximately) by the number of years of knowledge. In Lismore there are about 1.5 centuries of water level records so the 2022 level is lower than what is now the 1-in-100-year event, unless there is an aberration in the rain that fell or in the hydraulics of the floodplain through which water flowed. By aberration I mean something that can be remedied. Climate change will not be remedied for several hundred years.

The prime minister and others labelling recent floods as "1-in-500-year" or similar is a diversion. It supports the idea of putting things back the way they were, because this is so rare. Our new reality is what we just saw. Planning authorities now need to act and sufficient funding needs to be offered to protect people in floodplains. The best protection in Lismore's case is to relocate out of harm's way.

3. Byron Shire:

The price of the early March flood has been high - deaths, destruction, ongoing suffering and exacerbation of the housing crisis. I believe the ranking of issues that contributed to these hardships is: landslip, then flooding, then communication failures. The shortfall in capacity of emergency authorities must be recognised along with the brilliance of the volunteers who stepped up to fill those spaces.

- (i) I believe the Shire should develop a Landslip Management Plan. We have such Plans for flooding and funding is sought on the basis of the Plans. Landslip Management would cover: methods of avoidance (maintaining rural road drainage for example); registering historic slip sites; recovery procedures and aid (including a register of helipads, recognising and equipping local SES hubs and volunteers); how to re-establish access along with a hierarchy for doing so; long-term re-building and re-routing of rural roads.
- (ii) the Shire now has Floodplain Management Plans for all our waterways. These are comprehensive and were produced under strict state procedures. They contain lists of actions awaiting funding. These now need review in light of the 2022 event, and then funding.

Preliminary data indicates flooding in Mullumbimby and Ocean Shires was at match for the predicted 1-in-100-year water levels. In Byron Bay, that event was about 1-in-10-year.

The North Byron Shire Floodplain Management Plan of 2020 covers urban centres Mullumbimby, Brunswick Heads, Billinudgel, Ocean Shores, South Golden Beach, etc. I support the Plans' proposals. I'd like to distinguish two distinct approaches: new development must avoid floodplains; existing development must be assisted to adapt in situ. That assistance is best made by limiting investment on land below flood level and on land that becomes isolated during flood. Such assistance includes: house-raising; wet-proofing of houses that can't be raised; and buy back.

Other issues that must be addressed now are: effective flood warning; finding evacuation centres that don't flood; establishing and telling the public how to access the centres from the floodplain; reinforcing the SES; etc.

Mullumbimby floodwater depths are such that the town could stay where it is in my opinion (unlike Lismore's low-lying areas) with measures like house-raising. This needs funding beyond the usual 50/50 or 33/66 ratios of landowner / government. It needs a 10/90 ratio or similar, and an early announcement so that people raise their buildings before rebuilding. Many flood-damaged buildings have had their walls stripped to get mud out as well as because the materials are saturated.

The Shire's low-lying towns can stay where they are medium-term (a century or so) but in the long term, Sea Level Rise will take over.

- (iii) the frailty of our communications was exposed in March 2022. Comms regulations apparently exempt telcos from their service obligations if there's a so-called disaster. That is so wrong! Sure, it'll keep prices down but then the service isn't there when we really need it.
- (iv) Byron town was flooded in the 'second event', at the end of March. Rainfalls in that event were more coastal than the end of February event. Contributions of failures of human infrastructure like drains & pipes will be possible once flood levels have been surveyed.

4. Lessons for next time, climate change:

The reason to examine failures is not to lay blame, it is to learn and do better next time. In the case of flooding (and bushfire) we need to do even better and get ready for events of growing severity, due to climate change. We know from IPCC predictions that the changes in our region include longer hotter dry periods and wetter wet periods, including higher peak rainfalls (the ones that cause floods).

5. Urban catchments & West Byron:

The more we replace soft absorbent surfaces like soil and sand with hard surfaces like rooves and roads, the higher our flood levels will get. It's a fact. It applies everywhere including in Byron Bay, which was flooded by water that fell on it's own urban catchment. Every development contributes - planning controls need to share, evenly across each catchment, the precaution that is needed on this. For example, each allotment could develop say half of its surface area. The other half would be reserved to absorb water downwards. If that doesn't happen, then stormwater has to be absorbed by neighbours, including natural areas like Cumbebin Nature Reserve. Byron town has likely already passed a tipping point, where its remaining absorbent areas cannot do the job.

Sadly, Byron Bay CBD is about to be 'rescued' by a drainage project that introduces stormwater pumps to keep the town 'dry'. Like all human interventions, such pumps usually fail when needed. This has been the experience to date of the Shire's first such pump, at South Golden Beach.

In the case of Byron's embankments (the railway and the bypass) a key question is whether water east of each embankment was impeded from getting to its western side. This can be measured as 'afflux', the difference in water levels across the two sides of the embankment. We need surveyed flood levels to determine this.

West Byron will perform as I describe above. The development system only examines flooding through one very blunt instrument - it checks peak design floods and trims the peak flow back to a pre-development peak. The procedure fails however to deal with the increased total volume of stormwater runoff that accompanies the loss of downward absorption. Nor does the procedure deal with extended rain periods. This is a major reason why the approval of West Byron was a dumb act. We said goodbye decades ago to filling 'swamps' for suburbs. It's 2022 and this style of business-as-usual is unacceptable.

The Belongil Estuary and its low-lying surrounds will experience Byron Shire's earliest wake-up to Sea Level Rise later this century. Housing at Belongil will then compete with Ballina's low-lying areas for that honour. Our ocean has already risen 20cm and the rate of rise is accelerating. Air temperatures have already risen enough to deliver more storm rainfall than last century. Residents and businesses of the Belongil floodplain should oppose every new development in their catchment and Council should lead the way on that. The minimum action is to insist that new buildings are built to adapt to rising flood levels, by constructing them on adjustable piers. That also enables a no-fill policy, so that each new development doesn't push its share of floodwater onto neighbouring land, as West Byron will do.

6. No wind, no ocean storm:

The February and March storms were different from most historic events in that there was hardly any wind and hence not much ocean wave action. We were spared this time. Adding ocean factors to the volumes of rain we just experienced and to high Spring and Autumn tides will be a nightmare.

7. Up catchment matters:

There are two elevated bridges in the Brunswick valley: Williams and Sherrys. Nature proved at each bridge that the size of the waterway opening was too small.

Williams Bridge has the roadway flat on each approach so water cannot overtop the road. It blew the embankment away instead. Now the embankment has been restored in its original format, it will be hard to explain to government that the 2022 repair work has to be removed so the bridge can be duplicated.

At Sherrys Bridge, much of the roadway to the west is at ground level and is overtopped in big floods. However, the western approach rises at the bridge and occupies too much of the floodway. This resulted in 2022 in massive erosion beside the roadway. The eroded pond is about 50m long by 10m wide and up to 5m deep. It needs remedial action, as well as the bridge needing to be duplicated.

8. The future:

There are three things we can do:

- (i) get our emergency systems including communications in order,
- (ii) stop new occupancy of floodplains, and
- (iii) help those already living on floodplains to adapt.