Water Quality - the sleeping issue in the MDB? Webinar 2nd July 2025

Question #

#	Question	Asker Name	Answer	Answer Name	Answer	Answer Name	Answer	Answer Name
1	In Australia, aquatic ecological studies are based on top-down trophic interactions. In contrast the ecology of wetlands (all types) and storm water wetlands are driven by bottom up trophic interactions. Thus standard AUSRIVAS and SIgnal methodology does not work well. So why not use the aquatic microfauna.	robert walsh	Agree, there are opportunities for greater understanding of impacts to these aquatic ecosystems through greater investigation of the microfauna, which underpin trophic energy transfers, and recruitment of invertebrates and vertebrates. The loss of terrestrial insect fauna has implications for aquatic ecosystems that lose them as a food resource, as a ecosystem engineer to stabilise and oxygenate sediments, and to recycle nutrient. We have little idea across the basin of the scale of change and loss to these aquatic microfauna.	Matt Landos				
2	What learnings are there from WQ management in the Reef and Reef Regulation approaches to improving best management practice to the MBD?	Simon Catzikiris	live answered	Andrew Western				
3	My PhD research is looking at select heavy metal contamination on a small part of Wiradjuri Country, and the impact of that contamination on Wiradjuri Country and culture, i.e. what does it actually mean for Wiradjuri people that places of importance (culturally, historically, or personally) are contaminated? Could you talk about any work or thoughts you have on the wider impacts of Basin pollution on First Nations people? FYI I am Wiradjuri but am keen to hear from/about any Country/mobs.	Brianna Gordon	There is very little testing to ensure food resources from the system are safe for human consumption, be it heavy metals, or other contaminants like PFAS or TFA, or microplastics. Most of the PFAS chemicals are not being regulated, nor measured- it's a very large group of ~15,000 chemicals.	Matt Landos				
4	As of yesterday - the most prominent PFAS chemicals (PFOA, PFOS and PFHxS) are effectively banned in Australia. What implications for you predict for the environment and communities in the Basin? What about the less aknowlegded short chain PFAS chemicals	Therese Flapper	Reduced exposure to long chain PFAS is good for everything, so long as regretable substitution does not replace them with another persistent toxic petrochemical. They are recognised carcinogens and endocrine disruptors, and it is long overdue, but the regulation should have spanned the whole class as it is fast becoming clear the short chain PFAS are not safe either. EU now looking to take action on TFA, which is a metabolite of some PFAS including PFAS pesticides, and is recognised as a reproductive toxin. More to do to respond to the threat from this highly persistent class. Not placing wastewater biosolids back on agriculture, is one advancement that would avoid polluting more land, and later water when that land gets rain.	Matt Landos				
5	I'd be interested to hear your thoughts on the impacts of extreme events, floods and fire, on water quality, and what the future in monitoring this looks like?	Jackie Webb	live answered	Andrew Western				
6	How can citizen science be integrated more effectively into formal water quality data collection frameworks? Are eDNA and other emerging tools being used in tracking pollutants or ecosystem health?	Braeden Lampard	Reef very much relies on communities to help monitor our extensive area, we run formal training for them to meet water quality sampling QA needs so the data can be used.	Nyssa Henry	Building a citizen science database and interface that allows verified water quality measurements to be uploaded to a map offers a great opportunity to harness community to both look after their waterway, but also identify when and where problems are being generated, such that resources can be directed towards fixes. it has been done in areas of the US, and would be a good step for Australia, perhaps led through groups like OzFish/LandCare	Matt Landos		
7	How is evaluation of potential future water quality of the MDB being considered within the framework of climate change? Including changes to recharge events, droughts, etc.	Allison Reynolds	live answered	Andrew Western				
8	How can local communities and Traditional Owners be better supported to lead water quality monitoring or remediation efforts?	Braeden Lampard	In the Reef there is often a requirement for a portion of funding to be delivered by Traditional Owner groups - they are key particularly in local reveg efforts ensuring local species are planted by ranger groups	Nyssa Henry				
9	I'd like to know about the changes in human habitat over the past ten years for populations that depend on the Murray-Darling Basin (MDB), such as demographic shifts, urban expansion or contraction, land use changes, and socio-economic transformations influenced by the availability and quality of water resources within the basin.	Mostafizur Rahman						
10	Are there any complexities in understanding the pollutant sources or modeling water quality in the Murray–Darling Basin compared to other basins?	Shahab Uddin	We do lack knowledge of application of pesticides, so that regulatory change would greatly help assess sub-catchment loads, timing and support greater health epidemiological studies of ecosystem and human health	Matt Landos	From a modelling and understanding perspective the MDB is very large with a wide range of land uses so as a system it is more complex than many smaller basins. Monitoring overall is relatively sparse. In Australia, we have less information on input of chemicals to the landscape compared with jurisidictions in North America and Europe where much science comes from (but better than some other parts of the world).	Andrew Western	Our Reef Source Catchments modellers also used to model the Upper MDB basins so used the same approaches. Having a loads-based monitoring program is key for model validation. We switched to a monitored approach through for Pesticides due to the difficulty in modelling them, especially without good use data as Matt raised. We can see changes in pesticide concentrations fairly quickly but now use a combined MS-PAF risk metric to assess those that have similar modes of action to look at combined risk.	Nyssa Henry
11	How challenging is access to water quality data to progress?	Adrian Lill	In Qld they have the pesticide reporting portal. You can see it looks for a subset of the chemicals used by agriculture, but is far from comprehensive. Surfactants, personal care products, pharmaceuticals, plastics, PFAS are all yet to be monitored systematically in the waterways, and in Australia we also lack a human biomonitoring program, which the Uni of Melbourne Centre for Emerging Contaminants is promoting https://pesticidereportingportal.des.qld.gov.au/	Matt Landos	Both the monitoring and reporting is quite variable by state. The Bureau of Meteorology collates some basic water quality data nationally under requirements of the national Water Act 2007 but water quantity information has been a higher priority for them.	Andrew Western	Qld has an online Water Quality Data Portal called Tahbil for nutrients, sediment, pesticide and contaminant data https://apps.des.qld.gov.au/water-data-portal/ There is also an interactive report card for interpreted data across a range of indicators https://reportcard.reefplan.qld.gov.au/home?report=overview&year=63feba8962a7eebd85fb06ac	Nyssa Henry
12	policy is good and all. my question is about implementation. how do create design tools that can appropriately implement water quality. Important to note that (currently) civil consultants do not have appropriately design tools and about 99% of design s are not follow8ng guidelines.	Anonymous Attendee	Most Civil works are in urban areas and tools such as MUSIC and design guidelines are available and used for Water Sensitive Urban Design - probably more strongly implemented in the major urban centres where there is a higher capacity in planning authorities. The GBR Paddock to Reef program has been developing prioritisation tools etc to help with implementation of e.g. works related to erosion gullies and stream banks. However there are not comprehensive tools.	Andrew Western				
13	Is there a One Health Framework in Australia that intersects with First Nations peoples health regarding Water Quality from First Nations-Led Environmental and Health Frameworks developed by the MDBA First Nations Groups	Dianne Lucas	The commonwealth recently developed a One Health platform https://www.cdc.gov.au/topics/one-health however it has yet to meaningfully incorporate environmental contaminants and water quality into an appreciation of risks to human health. Presently it is focused on zoonotic pathogens is my understanding. I'm not sure as to the First Nations engagement, but you could approach them directly through link to ask.	Matt Landos				
14	How well understood are the WQ predictors of potential algal blooms, in the MDB and elsewhere? Is it a simple suite of nutrients, phys-chem parameters, stratification etc? Or are HABs so complex that they cannot accurately be predicted?	Bryant Gagliardi	live answered	Andrew Western				
15	I am interested to understand the timelags for the benefits of water quality improvement measures to come though as environmental and health outcomes. I ask because this affects the political case for investments. Unfortunately governments are not good at spending $ on outcomes that may not be seen for a long time.	Anthony Slatyer	live answered	Andrew Western				
16	Given that the impacts of poor catchment management on WQ are often felt 10s-1000s of kms downstream, what are some highly effective strategies we can use to promote/incentivise improved catchment practices by upstream landholders/users?	Andrew Kahn	live answered	Andrew Western				
17	How can we begin to help increase 'water literacy' across Indigenous communities in the basin? What support is needed to better empower Traditional Owners in this space?	Maggie McDonald			In the Reef space the Traditional Owner groups got together and developed their own TO Implementation Plan & receive funding to implement it https://reefto.au/ https://www.dcceew.gov.au/parks-heritage/great-barrier-reef/governance-partners/traditional-owners	Nyssa Henry		
18	Views on magnitude of response required to achieve outcomes and a time frame in which we need to....noting Murray is considered a region of high pollution risk (in global terms) by Tang and co., in 2021 - see https://rune.une.edu.au/server/api/core/bitstreams/f3633435-3fb8-45b9-b202-0e29010167eb/content	Anonymous Attendee	Hard to put specifics around this but the GBR program maybe provides a guide - https://www.reefplan.qld.gov.au/tracking-progress/paddock-to-reef. Another well known example is the Chesapeake Bay program in the USA - https://www.chesapeakebay.net. In Europe the Water Framework Directive has motivated basin scale actions to clean up water as well - https://environment.ec.europa.eu/topics/water/water-framework-directive_en. Big changes take time - think decade rather than year. Perhaps the biggest challenge here is to find alignment between water quality outcomes and land managers incentives that would be required to drive change.	Andrew Western	For Reef the costings indicate $8B to $15B is required to meet targets, however only have $1B to 2030. Murray Darling is quite well resourced by comparison with $13B.	Nyssa Henry		
19	How do you suggest improving education for users? Like farmers who are applying these fertilizers to their crops.	Allison Reynolds	An incentive scheme could be developed which supported a transition away from their use. France and germany have both got major agroecology transition programs underway to convert 25-205% of landarea over to agroecological farming. They have examples and have offered through the French consultate to show Australians what they have done, how they've monitored the change and what has been the results.	Matt Landos	Reef (State & Federal) fund grant schemes for landholders to improve land mangement practices as well as agricultural extension programs (in addition to the State regulating Agricultural minimum land management standards). https://www.qld.gov.au/environment/coasts-waterways/reef/reef-program https://www.dcceew.gov.au/parks-heritage/great-barrier-reef/protecting/our-investments/reef-trust/programs	Nyssa Henry		
20	The European Union has introduced The Nitrates Directive which aims to protect water quality across Europe by preventing nitrates from agricultural sources that pollute ground and surface waters and by promoting the use of good farming practices. The Directive aims to reduce water pollution caused by nitrates used in agriculture by monitoring nitrate concentrations of water bodies designating nitrate vulnerable zones establishing codes of good agricultural practices and measures to prevent and reduce water pollution from nitrates. This has been very effective at galavaising actions in EU nations to do riparian vegetation etc. Would it not be a way to go in Australia to protect all catchments?	Richard Campbell	We have a similar approach in Reef catchments where the nitrogen reduction targets have been scheduled in the EPP Water & the key sources regulated requiring nutrient management plans to ensure nitrogen use efficiency	Nyssa Henry				
22	Have you been able to show change over time, as a result of the GBR work? How hard has it been to link the positive change to new policy (is this how the funding/investment by government was committed)? (Sorry if you covered this earlier, I was stuck on a call I was trying to finish up)	Suzanne Acret	See https://www.reefplan.qld.gov.au/tracking-progress/reef-report-card		Yes - the Paddock to Reef Integrated Monitoring, Modelling and Reporting Program (Paddock to Reef program) tracks progress towards the Reef targets. This is reported via the Reef Report Card. While there has been some good progress towards some targets, more is needed to achieve the water quality targets. All Reef programs e.g. grants, extension etc. need to report via the Paddock to Reef program using tools like P2R Projector so contribute to the modelled water quality progress. https://p2rprojector.net.au/ https://reportcard.reefplan.qld.gov.au/home?report=overview&year=63feba8962a7eebd85fb06ac	Nyssa Henry		
23	Support for the improvement of water quality (and other aspects of aquatic ecosystem health) is massively under-funded in comparison to agriculture, food and fibre etc. When the source of water quality problems happens on land, how do we overcome this imbalance?	Anonymous Attendee	Almost all of the water quality problems are as a result of actions in the terrestrial landscape. Eg land clearing, riparian zone loss from cattle grazing, mobilises sediments and adds nutrient, fertiliser adds nutrient, pesticides wastewater emissions include our pharmaceuticals, surfactants, personal care products which are not completely removed in treatment plant. Drainage accelerates landscape dehydration and reduces streamflow persistence. In urban areas we have increased water temps through hard surface designs, that accelerate run-off and scouring velocities, entraining stormwater contaminants like plastics/tyre particles/oil etc. It requires political leadership to appreciate that the whole of government cost (rising cancer, decreased fertility, increased neurological disease, more diabetes/obesity+ag output+environment+town water supply/water security/drought resilience/fire resilience + productive years of a human life) can all be materially positively influenced by investments in agricultural transition, away from practices that continue to push us beyond planetary boundaries.	Matt Landos	Agree - The independent Reef Scientific Consensus Statement backs the need for greater funding to address water quality from land-based sources https://reefwqconsensus.com.au/	Nyssa Henry		
24	We cannot in my mind, discuss water quality without discussing soil and sediment quality.	Anonymous Attendee	Improved soil health would indeed have a correlation to water quality. More biological life in soils holds more water, stores more carbon, and can supply diverse nutrients to plants to improve the nutritive value of foods produced. Key components of improving soil health are avoiding synthetic fertiliser and pesticide inputs.	Matt Landos				
25	I have certainly heard of PFAS in environmental and scientific circles, but Andrew you mentioned PFAS is commonly heard of in the news lately.... I have not seen nor heard of it mentioned in the news ever on the Gold Coast. Is it common in the news in other states then? This is interesting if we are not communicating adequately across the GC catchment	DAVID BUCK	Carrie Fellner ran an excellent series of stories in The Sydney Morning Herald that amongst others brought more focus on PFAS.	Matt Landos				
26	Are we able to quanitfy the problems in terms of sources of pollution so we can target out efforts?Overall land mgt is important and has been for a long time, but there are many sources, including roads and rivers crossings, industries, spillages, etc etc and if we understand the problem better, we can target our efforts and be more persuasive in pushing for change, because we can support any initiatives with solid data. There was important work done on WQ in NSW	jamie morton	Unfortunately there is no requirement for some of the pollutants to be recorded at their point of use- such as fertiliser and pesticides. We have little to no idea of what goes onto each subcatchment. There is no aggregated database that tells us,how much was applied when and where and of what type. These regulatory reforms have been undertaken in some EU countries and would be a good step forward for Australia. There are some 297,000 chemicals in use- it is v optimistic to think we can get enough data for each one, to risk assess it, and determine safe uses, and predict environmental discharges. it is clear a focus must shift to Source Control, and the precautionary principle, where the essentiality of chemicals ought to limit the number that ever get produced, as we are unable to efefctively manage the risk once they hit market.	Matt Landos	A whole of basin integrated monitoring and modelling program similar to the Paddock to Reef program may help. Periodic funded reviews of the science to inform the updates of the Plans is also something done in Reef which helps to use evidence to prioritise key souces & managment responses. https://www.reefplan.qld.gov.au/tracking-progress/paddock-to-reef https://reefwqconsensus.com.au/	Nyssa Henry		
27	How the spatial variation of water quality due to the point sources across various reaches of the river (when segmented into multiple zones) affects the aquatic life like species composition, habitat suitability, and overall ecological sustainability?	Mostafizur Rahman	The upper darling has seen native species like silver perch become extirped, and huge declines in other monitored species like turtles, mussels, yabbies, shrimp, golden perch, carp gudgeons, murray cod. The long term monitoring across Namoi, Warrego, Gwydir has shown ongoing declines even after $13 billion in environmental water purchsed by the public. A focus on the contribution of the upper Darling land-uses to the degraded water quality has yet to be made. Worth noting a lot of the pollution is diffuse source, not point source.	Matt Landos	Point sources were originally thought to be the key water quality issue in the Reef catchments they now know they contribute less than 10% of loads of nutrients and sediment, the majority comes from diffuse source pollution as agriculture is by far the biggest land use.	Nyssa Henry		
28	Where in the MDB are the "hotspots" for these water quality issues. Twenty years ago we had a big program of preparing WQ strategies in Vic to address nutrient and BGA issues. We had some successes and in some places wq monitoring has continued. Is anyone looing at how successful/unsuccessful these strategies have been. Thre are plenty of solutions but the big issue is keeping people interested - extreme events are useful for focussing people's attention.	Pat Feehan	The majority of MDB water discussion has been about volume, not quality. Hence monitoring has occurred in association with the Environmental Water buybacks of biota to see if/where they responded. A series of reports of results are on the DECCW website. Eg https://www.dcceew.gov.au/cewh/water-region/gwydir Success requires long-term changes to food and fibre farming practices to control the risks at the source: fertiliser, surfactants (wetter/stickers), pesticides. And improve soil health through perennial ground cover, through increased diversity, and improved landscape hydration. These need to be incentivised, as they are unlikely to change at the rate and scale necessary to effect change.	Matt Landos				
29	My question. The intent of eWater Source is a hydrological modelling platform to support both water quality and quantity. However water quality functionality is very limited, as we struggle to find users willing/able to invest. How much is a lack of water quality modelling capability an issue versus onher needs, such as monitoring, impact assessment etc? (NB: QLD have made some investment for their specific use in the GBR catchment)	Trudy Green	Whilst it will be helpful to monitor responses to interventions, presently we don't have the type and scale of intervention being enacted to make a difference. We understand the direction for source control, and changes for landscape and hydrological cycle functionality. The incentives will need to meet the challenge of driving the transition or it won't happen IMO. And clearly the incentives will need to be substantially expanded from where we are right now. Australia achieved the highest rooftop solar PV uptake on the planet based on well shaped incentives. We need to do the same with agricultural transition.	Matt Landos	Reef has invested to build Dynamic SedNet functionaity as part of the Source Catchments modelling to greatly enhance the water quality modelling to better inform the sources of pollutants but also the impact of management responses to feed back into Policy updates every 5 years. It needs to be part of an integrated program with monitoring though for validation. See the Paddock to Reef program as an example. https://www.reefplan.qld.gov.au/tracking-progress/paddock-to-reef	Nyssa Henry		
30	How frequently are the water quality monitoring sites in the MDB tested? How is this information provided to the community?	Olivia Hadley	Adding to this - the differnces in reporting between states...	Floris van Ogtrop	There is some data on NSW Water Website, but it is often for a very small subset of physicochemical parameters. There is mostly nil monitoring of contaminants, and monitoring is not necessarily focused on events (rainfall) when pulses of contaminants are more likely. https://water.dpie.nsw.gov.au/our-work/allocations-availability/drought-and-floods/hypoxic-blackwater https://realtimedata.waternsw.com.au/water.stm?ppbm=210_HUNTER&rs&2&rsvm_org. Adding to this in Victoria there is good ambient monitoring of standard physico-chemical parameters and nutrients and "trend" analysis every 5 years. https://www.water.vic.gov.au/our-programs/water-monitoring-and-reporting/water-quality-trends. No routine event-oriented monitoring though. EPA Vic has report cards for largest estuaries - https://www.epa.vic.gov.au/water-quality-data-and-reports			

31	What tools are available to farmers to access higher quality water and maintain water quality of water run off?	Daniel Bosveld	Changing landscape hydration is one tool- See Mulloon Institute work. Use of contructed wetlands, riparian restoration and providing stock with off-river watering all help. Changing to agroecological farming makes a material difference to water quality.	Matt Landos				
32	There is a need to use more reclaimed water / stormwater and waste water for irrigated horticulture however, concerned re: additional nutrient loads, pollutants etc and impact to environment. How do you balance the need for water against the risk to the receiving environment in a way that is cost effective?	Lyz Risby	Source control of pollutants is the cheapest option. All end-of-pipe solutions are more expensive and usually less efficacious. We have to not pollute the water in the first instance, rather than incentivise and facilitate pollution, then try to remediate the now polluted resource. For pollutants like PFAS that are common in stormwater, its clear we need to manage them as a class of ~15,000 chemicals and like some US jurisdictions remove them as a permitted class of chemicals, so they can't be manufactured, imported and embedded into products that lead to emissions.	Matt Landos				
33	Severe WQ issue in MDB lakes and rivers such as fish kills is from the synergistic effects. How those multiple stressors causing synergistic effects could be identified in the context of management perspective? How efficeint to carry out the assessment of multiple stressors?	Giri Kattel	Researching the domino-set is a worthwhile endeavour, for it is the upper catchment activities that establish the water quality that downstream ecosystems then have to try to operate within. For example, Menindee fish kills were a consequence of the generation of poor water quality (nutrient enriched, metal enriched, pesticide enriched) from water that fell on land uses in the upper catchments of Namoi, Warrego, Gwydir etc. However we know already, that conventional agricultural landuses generate poor water quality. So a transition is needed.	Matt Landos				
34	Theres a political willingness to fund research, captial works, planning and education initiatives to improve water quality, but no one funds compliance initiatives to protect our catchments. Do you think we'd get better water quality outcomes if compliance was funded and supported adeqautely to address matters such as illegal land clearing, pollution, dumping, etc?	Peter Coad	My personal opinion is that there are greater gains to be made from incentivising the transitions in farming practice, and in wastewater treatment and biosolids management, than we might achieve from compliance.	Matt Landos				
		Peter Coad	Good point but so much 'damage' is absorbed by our catchments as our compliance reponse is triaged (based on resourcing) to a few instances which leaves our legislation and regulations poorly supported and implmented.	Peter Coad	At this time, I don't feel we have community level support for expanded compliance action on diffuse source water quality- although I appreciate your point. So were it to be better resourced, it might only stimulate a more vociferous negative campaign and not achieve improvement. Similar to what happened when the mining super profits tax triggered a PR campaign against it, and there was not sufficient community commitment to the policy to have it legislated and actioned. If however the incentives are so good, well understood and appreciated, and span all community groups from environment to health to agricultural production, that landholders cannot resist, then the resistance to change may melt away.	Matt Landos		
36	Who is legally accountable for a failure to protect the water quality and environment of the Murray Darling Basin?	Richard Campbell	In NSW EPA is the responsible agency.	Matt Landos				
37	How does poor water quality affect irrigation businesses ?	Anonymous Attendee	None of the costs around water quality are well documented. Some examples in irrigation context include issues around food safety - especially for fresh foods, additional costs of water treatment in e.g. drip irrigation, reputational impacts are important in markets - clean green food, salinity cost, etc	Andrew Western				
38	What is the level of reliability regarding the existing/ well-known water quality modeling?	Jannatul Ferdoush	This depends a lot on the context. If the modelling is backed up with good monitoring and investigation programs it can be good but very often water quality modelling is data limited. The monitoring in the GBR catchments, especially around quantifying the impacts of specific management practices greatly helps their modelling. The extent to which we need precise modelling depends on what we are using the modelling for. Where it can inform a direct management intervention (e.g. a water release to manage stratification and HAB risk) it needs to be precise enough to make the right decision, but this is the less common model use. More commonly we are looking at interventions that aim ot reduce contaminant sources. If we are using modelling to then try to add up the cumulative effect of interventions, modelling that is right on average might be sufficient to e.g. informsome policy.	Andrew Western				
39	What is the biggest challenge/gap in understanding WQ impacts in MDB? For Nyssa - what was your buggest challenge in determining what steps you needed to take to start considering options	Zara Lowien	One of the difficulties I see for farmers to comprehend the water quality impacts, are the Australian water quality guidelines- as in my opinion we've created numbers that are not based on how biology/ecology functions. We make decisions that are deeply anthropocentric in focus, and not eco-centric, which can inadvertently lead to accepting a degraded waterway. https://www.waterquality.gov.au/anz-guidelines/resources/key-concepts/level-of-protection The safety of the current guidelines has never been tested in the real world, in that we've never gone into the environments and checked if when the guidelines are met, that the ecology and biological health of species is indeed protected. To my knowledge there has never been field ground truthing of the modelled levels of species protection. The guidelines lack a mechanism to mandate action/funding when exceedances of guidelines are detected. As Nyssa mentioned there remain no shortage of exceedances of the guidelines in water running into the GBR as has been the case for all the time it has been monitored. Most pesticides are not even included in the guidelines, either due to lack of data, or lack of people/time to add them- hundreds are missing. The effect endpoint levels chosen are not the most sensitive (no endocrine/immunotox/behavioural endpoints), and thus give a false sense of protection from harm, if we meet the guideline levels. So I can understand farmer confusion when they change practices to meet a guideline, that gets considered as a target, but then are told the river ecosystem is collapsing due to poor water quality. In discussions with other ecotoxicologists like Prof Vincent Pettigrove they agree the Water Quality Guidelines are not protective. Australia has a social cultural phenomenon about our collective inherent Right to Pollute, often justified by a statement around a noble cause pursuit- eg power generation, growing food, mineral extraction. This creates an intense pressure point that I feel hinders the ready acknowledgement that current conventional farming drives external pollution. What is then even more challenging to acknowledge is that the level of such externality pollution is beyond what aquatic ecosystems can assimilate, without dire impacts to their health and function. Because the MDB catchment is modified and does not have the GBRMPA at its boundary, in the MDB a lower guideline value is considered the benchmark, such as 95% ecosystem protection, or 80%. Thus pollution is tolerated/accepted and with this, there is a tacit acceptance that it won't have an adverse impact on the reamining ecosystem function. Unlike the GBR where 99% species protection ecosystem guideline values are applied. One problem as I see it, is that this lower guideline generates tolerances (in regulators and community) for water pollution to be seen as inevitable and therefore acceptable, and that leads to the ecological problems we have demonstrated in monitoring studies.		Understanding the sources, drivers & most effective management solutions was challenging but significantly helped by the period synthesis of science to inform the Plan updates via the Scientific Consensus Statement https://reefwqconsensus.com.au/	Nyssa Henry		
40	Is the serious issue of Trifluoroacetic acid (TFA) being monitored or recognised by gov regulators/acdemia?	Jane Bremmer	TFA is not currently being monitored, and does not appear to be a focus for regulators, nor for the academic research community. It is clearly a threat based on recent data from EU showing rising levels of contamination there, and identification of its reproductive toxicity. It is one of the non-regulated PFAS, we essentially are only seeking to ban 3 of the compounds based on recent NHMRC advice. https://www.waterquality.gov.au/anz-guidelines/resources/key-concepts/level-of-protection	Matt Landos				
41	What are your thoughts on using community values to guide water quality risk assessments, monitoring and management? Should we be looking to the community to guide whats important and where our efforts are in this space, looking to the experts and taking an ecological or onehealth approach, or using a combination of the above?	Anonymous Attendee			In Qld, communities are engaged as part of the setting of regional Water Quality Objectives (WQOs) that are scheduled under EPP Water (based on various Environmental Values/water uses).	Nyssa Henry		
42	Does the panel a scenario where downstream users/ communities can take legal class action to upstream industry/ communities who's activities are demonstrated to degrade WQ and increase adverse health outcomes through lost work days and illness, increased treatment costs and maintenance to filter/ treat potable water supplies, downstream industry enduring losses in productivity through poor irrigation water/ loss of water reliability? Can we turn the burden of evidence to those polluting to demonstrate they are not having an impact individually or collectively?	Simon Catzikiris	Unfortunately I think this is not readily possible, noting I am not a lawyer. I've observed that legal action around contaminants in waterways has been very rarely commenced in Australia, and rarely successful. The legal burden of proof for example, demands that knowledge of a certain exposure to a certain brand of a certain product is necessary, and that this can be proven to have been the cause of the health issue. Such a burden of proof is very hard if not impossible to attain, as there are numerous opportunities for the defendent to create plausible deniability claims. Eg. NSW EPA took a farmer to court for alledged contamination of a town water supply dam with diazinon from their spray activity and drift. My understanding is the case was not upheld as EPA could not prove it was that farmer's diazinon and not any other possible source, given the array of premitted uses for the product at that time. Whilst some cases claiming cancer induction from glyphosate in USA have been upheld, (https://www.lawsuit-information-center.com/roundup-lawsuit.html) in Australia the class action did not progress.https://www.abc.net.au/news/2024-07-25/federal-court-herbicide-roundup-cancer/104142688 And furthermore we've never gone into the environments and checked if when the guidelines are met, that the ecology and biological health of species is indeed protected. To my knowledge there has never been field ground truthing of the modelled levels of species protection.	Matt Landos				
43	Burke and Wills observed algal blooms in the Darling River.	Paul Webb	There are some very useful explorer accounts that show water clarity in the Darling was good, that benthic native plants were abundant, that schools of fish were abundant. The fish traps at Brewarrina, were able to catch enough fish to support massive indigenous corroborees for days. This is not longer even remotely possible. Silver perch are extirped from the upper darling. Recommend the Codfather by Dr Stuart Rowland that brings some history together around Murray Cod. I would appreciate receiving the information demonstrating this reported observation by Burke and Wills- I've not seen such accounts.	Matt Landos				
44	Given SA's coastal massive and growing plume of toxic water killing off marine life that started near the Murray mouth, please prioitise studies assessing the water quality coming out the bottom of the MDB and working up to identify all the sources.	Anonymous Attendee	The guidelines lack a mechanism to mandate action/funding when exceedances of guidelines are detected. As Nyssa mentioned there remain no shortage of exceedances of the guidelines in water running into the GBR.					
45	Is it possible for partial modification and monitoring of WQ by dividing MDB into effective zones where there are anthropological differences- as in different activities causing the pollution? there might be a zone difference and the monitoring can pickup of various pollutant and the major ones contributing which lead to spatial modification to the MDB zone as not all the pollutant can be at same level considering the activities?	Anonymous Attendee	Given the diversity of environments in the MDB, I think this would be essential.	Andrew Western				
46	Carp muddy our waters stopping sunlight and making it hard for aquatic plants to grow. How does this impact water quality? Is it not the first thing we need to tackle?	Rosalie Auricht	Most of the muddiness comes from unstable riverbanks from loss of vegetation, and run-off from cleared farmland. Yes it does remove light and impact native plants performing their ecological services in the rivers. Carp get a lot of blame, but in effect are the last fish standing- they are more tolerant to the hostile water quality conditions we've created, they are able to exploit the artificial drainage channels we have created to breed in, whereas our native fish are far less tolerant and proficient. They tolerate lower oxygen levels. Human modification of the system has dramatically favoured carp over native fish. Carp are a resource that is assimilating some of the excessive nutrient that is entering the rivers from fertiliser use, and wastewater. Incentivising harvest may help a little, but likely not much- unless the other major factors driving poor water quality are addressed they are unlikely to drive a native fish recovery.	Matt Landos				
47	Hi Andrew, are you going to address the pre-webinar questions?	Anonymous Attendee	The effect endpoint levels chosen are not the most sensitive (no endocrine/immunotox endpoints), and thus give a false sense of protection from harm, if we meet the guideline levels. So I can understand farmer confusion when they change practices to meet a guideline, that gets considered as a target, but then are told the river ecosystem is collapsing due to poor water quality.					
48	If we rely on modelling to assess benefits and drive investment, how do we deal with all the contaminants of concern we can't actually model?	Anonymous Attendee	You've identified clear limitations of modelling. Driving the focus back to improved source control, and thus improved regulation of all petrochemicals/plastics. With 297,000 chemicals on the market, we cannot get the data let alone perform robust risk assessments for each one, let alone the complex mixtures that occur. Re-engaging the precautionary principle appears necessary, and consideration of dramatically reducing numbers of chemicals in use, to those which meet criteria of essentiality, where greater controls could then be generated. In discussions with other ecotoxicologists like Prof Vincent Pettigrove agree the Water Quality Guidelines are not protective.	Matt Landos				
49	To what degree are plastics (micro/nano/other) an issue for the reef/MDB, in impacting on coastal systems. And are any methods for monitoring being developed - either in catchment or estuary/coastal? Or is this considered less of an issue in comparison to nutrients/pesticides etc.	michelle donnelly	It is not less of an issue, but is largely monitored. Major sources are wastewater synthetic fibre emissions and use of biosolids back onto agricultural land. There is also substantial volumes of plastics					
50	TRUII and the QWMN did some good work on how to use the E Water Source model for the Qld MDB to prioritise works/investment to improve WQ.	Paul Webb	I think this might be refering to https://truii.com/reefonomics/ One of the architects of these was Michael Warne, who prior to his passing told me that it was his view that the guidelines had to not be open to be viewed, or construed, as overly protective, lest farmers would attack them. This perhaps captures a social cultural phenomenon Australia has about it's inherent Right to Pollute, and the intense pressure point that acknowledges that current conventional farming drives external pollution. What is then not able to be acknowledged is that the level of such externality is beyond what aquatic ecosystems can assimilate, without dire impacts to their health and function.	Andrew Western	Feel free to read up on this suggestion here: https://naturalcapitalsuite.au/region/ Environmental Water tools here https://truii.com/stories/#environmental-water https://truii.com/eco-risk-projector/ https://truii.com/eflow-projector/	Nyssa Henry		
51	Sounds like chemical use for agriculture is having big impacts on water quality. Consumers pay a premium for organic produce. Is there a way to push the cost of chemical use back to those using them? I.e. economic solutions	Tristan Graham	The polluter pays principle is something that would enliven the discussion. If that principle were to extend into the health care costs incurred, it quickly becomes apparent that finding methods to produce food and fibre without the agrichemicals is economically and socially desirable. https://ipes-food.org/video-and-media/fuel-to-fork-podcast/					
52	Please correct me if I am wrong, but isn't one of the issues is that unless we do physical sampling across the country for an expansive range of contaminates, we don't actually know the current state of water quality in locations. If you don't test for it, you won't find it. Need testing to set baseline data source for a point in time, then a robust retesting/sample collection schedule using mass spectrometry. For most regions in Australia, do we even have enough information to do effect risk focussed programs? I read that in terms of PFAS in NSW - it wasn't identified in some areas early on as locations didn't rate as a 'hot spot' under a risk framework.	Anonymous Attendee	What you can infer from the limited amount of testing existing to date is that when you look for these chemicals you very often find them so they do move from point of application into the general environment. See https://doi.org/10.1021/acs.est.4c03875 for one exampel in a flood context. In that case the size of the source will be very imortant to risk analysis. If we had input information, that would be a strong start in terms of risk assessment region-by-region. Any broad monitoring in the environment needs to be really strategic or it will fail at the budget hurdle.					
53	Recent European studies are pointing to sewage discharges as the main factor , far greater than agriculture . I suspect the same is true with the MDB especially with Canberra as the largest urban centre discharging into the MDB . Estrogen in sewage has been implicated as a major environmental disruptor with fish etc . Should the focus be on removing sewage discharges from the river rather than water volumes , the current flushing toilet approach to the MDB . My major concern is to understand the MDB system as a holistic also approach involving invasive species . There is also the issue of natural occurring nutrients such as phosphate according to Professor Martin Thoms with the Darling system . We need to have a helicopter view of the whole system and how it all interacts	13:03:44 From Darren De Bortoli to Everyone:	Agree wholistic approach needed to achieve water quality improvement. Currently EPA does not require monitoring of any pesticide, pharmaceutical, personal care product, or PFAS contaminants from wastewater effluent. So we don't know the scale of that pollution. Also ~ 75% of the wastewater sludge (biosolids) is recycled onto agricultural land in NSW. I'm not sure how much of this is in the MDB but it brings another source of contaminants into the system. The human population densities are relatively small in MDB compared to European situation, and agricultural chemical use considerably higher. Australia's pesticide use volumes have roughly doubled in the last decade to $4.5 billion in 2023/24, whereas the Biodiversity Convention which Australia is a signatory to has called for a 50% reduction in pesticide harm by 2030. It is clear we are not on track to meet our obligation. The amount of that pesticide used in MDB is unknown, as the regulator does not require the data to be collated. In EU the amount of pesticide use is falling.https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agri-environmental_indicator_-_consumption_of_pesticides . We see significant water quality deterioration in the upper Darling, where there is little WWTP effluent, but significant agricultural interface, and here we also have now many years of monitoring demonstrating the decline of native species. WaterNSW describes its role as " It is our responsibility to capture, store and deliver water, when and where it matters."	Matt Landos				
54	The current toxic algal bloom in SA is due to Karenia Mkimotoi which requires nutrients , warm water and lower salinity of around 25,000 to 30,000 ppt . So should fresh water discharges in summer be treated as an issue in itself ?	13:10:59 From Darren De Bortoli to Everyone:	K. mikimotoi survive fine at full marine salinity, they do not require freshwater to drive the bloom. There is a bloom in Port Lincoln also at the moment. The issue of what the Murray discharges is however of importance to the health of the receiving ecosystem- the excessive nutrients are a problem in their volume and the form of nitrogen, the entrained contaminants of all sorts from agriculture, stormwater, wastewater are a problem, as many are hydrophobic and stay on water surface, some bind to microplastics and get inadvertently eaten by zooplankton that carry the contaminants into the food webs. This harms the sea surface microlayer, and impacts marine foodweb productivity- more information at : https://www.ipen.org/documents/pristine-polluted					
55	What scientific evidence is there that "trees create rainfall" via nucleation? My understanding is that there are a limited range of atmospheric conditions under which even deliberate cloud seeding activities (i.e. with silver iodide) under which there is a material increase in rainfall? Can publications be provided please?	13:15:03 From Phillip Jordan to Everyone:	https://pubmed.ncbi.nlm.nih.gov/31123327/ https://www.abc.net.au/news/science/2018-09-15/trees-make-rain-ease-drought/10236572 Lots of references in bibliography of this resource that relate to how land-clearing has dropped rainfall, and trees promote rain. https://d3n8a8pro7vhmx.cloudfront.net/ncec/pages/50/attachments/original/1486958794/NEFA_BP_Clearing_Our_Rainfall_Away.pdf?1486958794					

56	NSW water management prioritise economic outcomes from their management of MDB rivers. In the NSW WMAct the health of the rivers (ie water quality) should be the first concern. Despite this, the socio-economic studies done so far have been of poor quality and are not reliable. For example the biggest employers in Walgett (beside the Council) are delivering services for wellbeing and to address poor health. How to get some proper studies done looking at the socio-economic impacts of poor water quality/river health, and the economic opportunity losses because the water quality is poor in MDB?	12:49:29 From Dharriwaa Elders Group to Everyone:	This is not an complete answer but more some reflections on the question which is spot on. Absolutely agree with the comment under the NSW Water Management Act 2000, sustaining the health of rivers and water-dependent ecosystems is supposed to be the top priority of water management. It's clearly not happening - how does this then expose the NSW government to the potential of legal action or significant political pressure being applied from river communities? We know, from looking at examples from overseas such as the Delaware River in the US, that the economic benefits of improving water quality have positive economic effects. Research showed that "relatively" smaller investment in cleaning up rivers resulted in multiple millions in annual benefits through fishing, tourism, agriculture and more (https://www.wrc.udel.edu/research/benefits-of-improved-water-quality-in-the-delaware-river-basin/). A big one in my view is taking riparian restoration seriously - main channel and also upper reaches. In terms of conducting more robust studies to understand direct links between water health and human health and socio-economic outcomes for river communities, it would be nice to bring together, for example, the Department of Planning and Environments, Water NSW, and NSW Health to try and match up data i.e. look at health/employment/crime statistics by irrigation valley and compare to water quality and quantity statistics. While it will always be hard to prove causal links, together with surveys and qualitative work, one could build a pretty strong case. I know that the DPE's Aboriginal Water Program, Water Strategy and Policy were looking into this some time ago. Perhaps there is some	Floris van Ogtrop				
			One of the problems in this framing of water, is that it is far removed from how the MDB's aquatic ecosystems have evolved with natural hydrological cycles, and suitable water quality.					