

Macleay River Working Group 24th May 2018

Science, government and community getting together to support the health of the Macleay Catchment, residents of the Macleay can be grateful for the skill, commitment and vision of those working together to understand and respond to the challenges of historic contamination of the river.

Representatives from 9 government agencies, 2 universities, Kempsey Shire Council, a Coastal Science Consultant and SOMR met at the invitation of John Schmidt Coast and Estuary Officer from the Office of Environment & Heritage to review progress and discuss updated information regarding the health of our river. John acknowledged the high level of trust that exists between community, research and govt agencies.

Andrew Sampaklis from the Legacy Mines Program (formerly the Derelict Mines Program) outlined the works currently being undertaken in the catchment, the GHD Derelict Mines Audit report is not able to be released at this point, however it is informing current and planned works.

Recommendations from the report include:

- Kapunda – Tilbuster Ponds sub-catchment, 8 km north of Armidale – UNE has completed an assessment and the report is pending, this will inform a forward works program.
- Mungay Creek – mine waste is quite stable, with significant revegetation, remediation work may create more of a problem by disturbing stabilised minerals. Future land use needs to be considered, the possibility of local government controls to ensure the area is not disturbed was discussed. Ground water sampling would be good, but too expensive. An ecological risk assessment was recommended but this is beyond the Legacy Program's remit.
- Gibson's Open Cut Mine – assessments and the current Remediation Action Plan are now outdated, revegetation trials to stabilise the area are planned for 2018/19.
- Rockvale Mine has easy access, works are under way capping mine tailings, diverting clean water and revegetation.
- Hillgrove is a significant contributor of mined arsenic and antimony in the catchment, it is a complex mineral field, with numerous legacy mines outside the footprint of the current operations. Current operations (care & maintenance) are not having an impact on the catchment.

Professor Scott Johnston from the Geoscience Department of Southern Cross University discussed how arsenic and antimony change their chemical forms (speciation) depending on oxygen, acidity, temperature and seasonal variations. These factors strongly impact on the mobility and bioavailability of these elements in the river system.

- Water and sediment samples have been collected from inaccessible areas from below Bakers Creek and have undergone sophisticated analysis. In general, antimony is more mobile in the river waters than Arsenic.
- In collaboration with SOMR, SCU have analysed water samples collected over the last two years from Bellbrook. Arsenic mobility in the system is showing significant seasonal trends and is higher when temperatures are warmer. Concentrations of both antimony and arsenic in river water vary considerably over time.
- When sufficient data is collected and combined with flow rates from Georges Junction, SCU will model how much material has gone through the system and be able to estimate the time frame for the return to background (natural) levels.

- A significant amount of nitrate, from fertilizer run-off, is introduced into the river system during flood events, this impacts algae and weed growth, affecting oxygen, acidity, the geochemistry of the river bed sediments and therefore the speciation and mobility of arsenic and antimony.

What are the impacts for a warming climate?

Associate Professor Sue Wilson leads the Pollution Science Research Group with Associate Professor Matt Tighe in the School of Environmental and Rural Science at the University of New England. UNE have been involved with research in the Macleay Catchment for over a decade. Both UNE's and SCU's research complement each other. UNE's focus is on the bioavailability, particularly of antimony and arsenic in the catchment. Due to the unique situation in the Macleay the research is of global interest and UNE have over the last year been involved with organising and presenting this work at international meetings on antimony.

A/Prof Wilson presented the PhD work of Maxi Obiakor, investigating Ecotoxicity Assessment for Antimony Pollution in Contaminated Ecosystems. His thesis is complete, and the outcomes are being published in journal papers now. SOMR will support accessing and distributing this information.

UNE are seeking grants to further investigate impacts to ecosystems from antimony contamination with an emphasis on availability and accumulation in biological systems and have been successful with some over the last year.

There has been limited research into the impact of antimony in food systems, random sampling by the Department of Primary Industries indicates that there is little impact, however it was agreed that more robust investigation would be of benefit to residents and food producers in the catchment.

UNE have been working with the Legacy Mines Program to assess and recommend a works program to remediate Kapunda – Tilbuster Ponds Antimony Mine.

UNE are applying to the Australian Research Council ARC for a linkage grant to investigate "Advancing mine site remediation with low cost technologies". They need industry support, the challenge being, that now it is in care and maintenance, funding is no longer available from Hillgrove Mines. They will seek partnerships and support from agencies and community groups. A very exciting project for SOMR.

A further proposal is to work with SOMR and SCU to organise a community information presentation later in the year.

Next year A/Prof Wilson will be chairing and presenting the Macleay work on the ecotoxicity, bioavailability and uptake of antimony at a conference (ICOBTE 2019) in China, the world's largest producer. She noted that outcomes from the Macleay research are being used to fill gaps not just for the region but worldwide in understanding the risk of this element in the environment that enables the establishment of reliable protective guidelines and management action.

A/Professor Wilson's colleague, Associate Professor Paul Ashley shared the results of recent work done at the Gibson's Open Cut Mine at Hall's Peak. The mine has significant accessibility issues, with unstable material on the steep surface, in addition there are acid mine drainage problems.

Seepage from the site travels via Barker's Creek into the Chandler River. The impact on water quality is minimal, as the acidic water is quickly diluted in the main river, there is however impact on

amounts of lead, zinc and copper in the sediment. The form of these metals is such that their mobility in the system is low, questions were raised about the metals changing form (speciating) as with arsenic and antimony, however they are more stable.

Paul supervised a project to analyse the site and to develop efficient neutralisation strategies, recommendations were as follows:

- Chemical and Engineering solutions need to be combined
- Lab work identified that limestone, dunite (a coarse-grained rock), garden mulch and diatomite (kitty litter) are very effective at absorbing heavy metals and neutralising acidity, it was estimated that 600 tonnes of material would be required.

The construction of benches and bunds down the slope, in addition to absorbing material, would stabilise and neutralise the site.

It was acknowledged that this would be expensive and logistically difficult. As the mine is currently covered by exploration licences, Paul suggested that any future mining operations commencing on the site could be bound by a caveat to ensure remediation of the current issues on the site.

Verity Rollason, a Senior Coastal Scientist from BMT Consultancy spoke about their brief from Kempsey Shire Council to review the existing estuary plan and to develop a new Coastal Management Plan to meet new State Government requirements under the Coastal Management and Marine Environment Management Acts.

The new plan will replace the current Coastal Zone Management Plan and outlines 4 management areas

- Coastal Wetlands and Littoral Rainforests
- vulnerability areas - estuaries with plans for future challenges (adaptation for climate change)
- Environment area
- Coastal use area – recreational

KSC and BMT will be consulting with the community through an online survey, to be released in a couple of weeks and a Risk Assessment Workshop to be held on 28th June – SOMR will promote these processes.

John Schmidt from the Office of Environment and Heritage summarised the goals and achievements of the Macleay Working Group to this point

- EcoHealth Report completed
- Research – significant robust research is taking place and planned for the catchment. Research areas include
 - Biologic uptake and pathways into food webs
 - Backswamp soil concentrations
 - Ecotoxicology in estuarine environments
 - Improving Environmental guidelines for Antimony

- Communication strategy – engagement with community (SOMR)
- Review land use planning policy – underway with Coastal Management Plan

SOMR would like to thank the participating agencies for the work they are achieving that benefits residents of the Macleay Valley:

Office of Environment and Heritage

Local Land Services

Kempsey Shire Council

NSW Fisheries

Mid North Coast Area Health Service

Southern Cross University

Legacy Mines Program

Environmental Protection Agency

Department of Primary Industries

National Parks and Wildlife Service

BMT consultancy

University of New England