

The 2008 aquatic invertebrate survey – why read the report, and why was the survey done anyway?

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Background

The report about aquatic invertebrates has been written primarily with biologists in mind – or people with at least some background in biological sciences. The reader might come across so many unfamiliar terms and concepts that the whole report becomes incomprehensible, or worse still, misunderstood. This would be an unfortunate outcome, because in fact there is a fairly simple message. In order to defend the drainage program against uninformed criticism about groundwater disposal, Yarra Yarra people should make an effort to understand this survey report – its purpose, methodology, findings, and recommendations for future improvements.

Invertebrates are commonly used as 'bioindicators' of wetland health. Which means that this survey of aquatic invertebrates wasn't carried out because we think that the microscopic animals might one day be useful for food or fibre, but to assess

- (i) the level of pollution and effects on biodiversity produced by discharging groundwater, and
- (ii) the ability of the saltlake chain to maintain 'ecosystem services', and
- (iii) if, someday in the future (hopefully the distant future), we decide to use the area for something other than wheat-sheep farming, the countryside (including the saltlakes) won't be so 'altered' that it couldn't be adapted to its new landuse. In other words, we need to 'hedge our bets' now so that we don't limit our options for the future.

Only the first of these issues (pollution and impact on biodiversity) is addressed in the report. The other two issues (ecosystem services and future landuses) are worth thinking about though.

Definitions

First of all, some basic definitions are in order.

aquatic = having to do with water. In this case, the term refers to organisms that live in water (as opposed to 'terrestrial' organisms, which live on land), and this may be fresh or saline water.

invertebrate = animals without backbones (as opposed to 'vertebrate', which are animals with backbones). Vertebrates include the mammals (including humans), birds, fish, snakes and lizards. For convenience, the invertebrate group is often split into macroinvertebrates ('macro' means big) and microinvertebrates ('micro' means small). Microinvertebrates include such microscopic animals as protists, ostracods and rotifers, which might be unknown to many people, but are very familiar to biologists. Macroinvertebrates are bugs that can be seen with the naked eye. In the Yarra Yarra saltlakes, the most conspicuous macroinvertebrates are crustaceans (such as the various kinds of brine shrimp), snails (like the *Coxiella* turret shell), and insects (especially the larvae ('wigglers') of midges and mosquitoes).

Bioindicators

Aquatic invertebrates are ideal as pollution-detectors because they're numerous, they spend a large portion of their lives actually immersed in water, many are known to be sensitive to small chemical changes (and some are tolerant), they grow fast and are relatively short lived, and they're at the bottom of the local food chain.

Microinvertebrates (as well as microflora, such as microalgae and microscopic plants called diatoms, which we don't specifically examine in this survey) are eaten by macroinvertebrates (beetles, dragonfly larvae, waterbugs etc). These macroinvertebrates are eaten in turn by a succession of other animals (fish, waterbirds, water rats etc), vertebrates as well invertebrates, terrestrial or aerial as well as aquatic. A typical foodchain series might be 'protist – midge larva – water beetle – dragonfly – skink – dunnart – owl'.

Note that the higher in the foodchain an organism is, the more mobile it is, and the less it is likely to depend on a single food supply. Thus, if you examined the stomach contents of an owl, you could never be sure which item came from which part of the landscape.

[Besides, imagine the practical difficulties involved in capturing owls and persuading them to hand over the contents of their stomachs.]

Ecosystem Services

Ecosystem services are all those utilities we benefit from, like clean air and clean water. These are usually so obvious we simply take them for granted, and only notice them when they're gone. As far as the saltlakes are concerned, the most obvious service they perform is drainage – which has nothing to do with their being salty or not, only that they occupy a low position in the landscape. But they also support a diverse range of invertebrates, which have roles such as cleaning the water, and being prey items for birds and insects -which pollinate crops and eat pest insects.

If you doubt that drainage really qualifies as a service, recall how soggy the saltlakes become almost every winter, and imagine this waterlogging spread over the surrounding paddocks. Then occasionally, there's a major flood in part of the catchment. For example, heavy rain fell near Yalgoo in Autumn, 2008, then the floodwater made its way slowly downstream beyond Morawa over the following months.

There's no reason to suppose that deep drains would jeopardise these landscape-scale processes. However, there *is* a mechanism whereby deep drains might be having a small effect. Microfauna and microflora together form crusts that are known as 'microbial mats' or, if they form underwater, 'benthic mats'. These crusts trap sediment particles and thereby help to stabilise the wetland; they also help process nutrients and keep the water clean. On the rare occasion when floodwaters rush across the countryside, these crusts help protect the floor of claypans and saltlakes from scouring, and thus from exporting large quantities of sediment.

If the organisms that form the benthic mat are killed, e.g. by poisoning or by burial, then the protective crust is removed. Some lakes and channels are eroded; others become muddy with deposited silt.

A certain amount of sediment has probably always moved with floodwater. What's beginning to happen now isn't something new; it's just a matter of degree. More

sediment than usual is making its way through the screen of marginal wetlands to the major saltlakes, such as Mongers, Weelhamby, Goorly, ~~Nullewa and DeCoursey~~ and Nullewa. The danger is that these major saltlakes, big as they are, might eventually silt up completely. If this happens (and it's probably a process that's been underway since land-clearing began), then there could be a huge increase in the frequency and severity of floods.

Future Landuses

As for future landuses, if we knew what they were, then we could make all the right preparations now. Unfortunately, we don't, so we can't. All we can be sure of is that someday there'll be a change. It might happen next year, next century, or not for a thousand years, but it's inevitable that someday either we ourselves or our descendents will have to find other ways to earn a living. All we can do at the moment is hedge our bets and keep as many options open as possible.

Clean saltlakes is one of those options. It's not inconceivable that we might someday want to use the lakes for fishfarming, or for harvesting some chemical or mineral. If we really have to do things now that alter the lakes and restrict our options for the future, then so be it. But it's not something that should happen accidentally, simply because we haven't bothered to find out the long-term consequences of our activities.

And here's a question to consider: should decisions about future landuses, or decisions that limit future options, belong to the current landholder? Or should other members of the community have a say?