River dreams and the making of urban streams

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Key Points

- Our approaches to urban waterways are constantly evolving to reflect shifting social norms and values predominant at the time.
- The dominant paradigm shaping waterway management today reflects the desire to restore degraded waterways towards 'natural' conditions, using science to mimic nature.
- Mimicking nature has fundamental limitations in the urban context, and while we are focused on this goal, we may miss opportunities to imagine more diverse potential outcomes for urban waterways, including outcomes that better reflect community aspirations.

Abstract

People have always modified the landscapes in which they live, including the waterways. When we look back at how Australia's waterways have been modified since European settlement, it seems clear that many of the modifications have been negative. However, when we consider the paradigms shaping waterway management at the time, we can see how the actions taken were informed by 'dreams' of improvement and progress. Waterway management today is informed by technical disciplines yet dreams still fuel the process. We imagine the conditions we wish to achieve in waterways, and then translate these into objectives, targets and design responses. Typically we aim for conditions as close to 'natural' as possible, yet in an urban context, fully natural waterways will always remain a dream. In highly urbanised settings, it's often clear that restoring natural waterways is out of reach, yet we lack clear visions for what else might be achieved. This paper examines, through a series of critiques and explorations, how dreams have shaped waterway management in the past, and asks how we should conceive of new dreams weaving together the cultural, ecological and recreational aspects of our urban waterways today.

Keywords

River dreams, urban waterways, restoration, naturalisation

Introduction

When European settlers arrived in Australia, they modified the landscape and waterways significantly and irreversibly. When we look back at how Australia's waterways have been modified since European settlement, it seems clear that many of the modifications, particularly in urban areas, have been negative: natural features have been destroyed, natural processes interrupted, and ecosystems damaged irreversibly. However, people have always modified the landscapes in which they live, including the waterways. Thanks to writers and public figures like Bruce Pascoe, we are also now beginning to understand pre-colonial Australia as a land shaped by humans: landscapes intentionally managed to take a form conceptualised by people, and ecosystems modified to enhance processes that would support the human population. If we are to re-examine our understanding the nature of land and waterway management in a pre-colonial landscape, this prompts questions about the nature of colonial and contemporary land and waterway management.

Full Paper

Alexa McAuley - River dreams

Waterways have always been important to human settlements, and we've modified them, and go on modifying them, in many different ways. How we engage with, manage and modify rivers is underpinned by our dreams. Whenever people manage landscapes and waterways, our starting point is often an aspiration or a 'dream' to create something different. In this paper, we use the term 'river dreams' to capture how the dominant paradigms of the time underpin the way that we approach waterway management and the vision of an urban waterway that we are trying to create. This paper borrows the term "River Dreams" from Ian Tyrrell's social and environmental history of the Cooks River, *River Dreams: the people and landscape of the Cooks River* (Tyrrell, 2018). Tyrrell explores how people have shaped the landscape of the Cooks River valley and the waterway itself. Tyrrell writes that *"humans have manipulated rivers for thousands of years, and changed them in the process... [The Cooks River's] essence… lies in the visions humans had for it, and for all nature – expectations that repeatedly made it a river of dreams, albeit ones repeatedly dashed or modified."* (Tyrrell 2018, p.xii).

Looking back at waterway management in the 19th and early 20th centuries in Australia, it is relatively easy to see how the cultural values of the time informed people's dreams and aspirations, and how these dreams in turn were translated into waterway management works. It is also relatively easy to see what went wrong – European settlers failed to understand Australia's climate and ecological conditions, pursued unrealistic visions for waterways, and could not foresee the negative consequences.

Today we imagine ourselves better informed by science, yet river dreams still play an important role in waterway management. Typically, waterway management projects start with a vision; often this blends multiple objectives, reflecting community aspirations for waterways today, and therefore also reflecting contemporary cultural values. We use scientific knowledge and engineering approaches to translate the vision into technical terms, yet the vision itself is a dream – an imagined set of conditions, which we then attempt to replicate in the real world. While we may have learned to avoid some of the past mistakes of previous generations of dreamers, it is still worth considering the potential limits of our imagination and propensity to blind spots in our thinking today.

Colonial river dreams

Ever since Europeans settled in Australia in the late 18th century, people have made substantial changes to the landscape and waterways. However, rather than a single period of change after settlement, changes have been ongoing, particularly in urban areas. The period since Australia's settlement has involved substantial social and economic changes, and as society has changed, approaches to waterways have also evolved. The waterway management efforts of each generation have reflected the ideals and aspirations of the time. Early European settlers dreamed of garden landscapes with rivers at their heart, while nineteenth century industrialists imagined waterways as grand canals enabling production and transport of goods. Later, suburban ideals shaped urban waterways. Tyrrell (2018) illustrates how the Cooks River has been shaped through a range of different periods in the colonial and 20th century, to understand the modifications people made to the River in terms of their dreams:

- In the early 19th century, the landscape of the Cooks River was strongly influenced by the English Landscape Garden tradition and the emerging landed gentry seeking pastoral landscapes reflecting their social aspirations and a desire to inhabit a landscape resembling the pre-industrial English countryside.

- In the mid 19th century, the Victorian notions of 'improvement' and 'colonial progress' were key in shaping the Cooks River's history with construction of government infrastructure including a water supply dam on the river, river crossings, and modifications for industrial uses including sugar mills.

- In the early 20th century, modernist engineering and the modern-day dream of residential suburbia impacted on the River, resulting in a tamed and concreted drain "making explicit in engineering terms what was obvious in social and economic functions" (Tyrrell, 2018 p.5).

Erica Nathan (2007) similarly documents how our values have shaped waterways and riverine environments or 'waterscapes' in *Lost Waters: A History of a Troubled Catchment* – a history of part of the Moorabool River in Victoria. Nathan draws attention to how waterway management needs to understand the experience and values of people.

Today's river dreams

When we manage waterways today, we imagine ourselves to be better informed by science, yet dreams still play a crucial role in the process. Typically, waterway management projects start with a vision; often this blends multiple objectives, reflecting community aspirations for waterways today. From this point, the vision is translated into technical terms – objectives, targets, design principles and development controls. Therefore today we are still inventing dreams for our waterways. We can see waterway management today as informed by technical disciplines yet fuelled by dreams.

Today's river dreams, as in the past, are embedded in our society and culture, and remain important in the way we understand and shape the world around us. A dominant paradigm in Australian urban waterway management today is the restoration of degraded waterways towards more natural conditions. We use science and engineering to translate the concept of restoring natural values into technical, quantitative terms, from objectives and targets (e.g. water quality and hydrological parameters) to design principles and templates. Tyrrell (2018) has succinctly called the current dominant paradigm in waterway management "mimicking nature". He uses the term to describe an ecological engineering approach, which emerged in Australia and internationally around the 1990s, and involves rejuvenating disrupted ecosystems using engineering technology. Constructed wetlands are one example; waterway naturalisation projects are another. While emphasising the 'natural' and aiming for sustainability, new forms of man-made landscapes are designed and built, using natural elements and mimicking natural processes.

A feature of ecological engineering approaches is that they are strongly informed by technical input. They rely on science, technology and design to identify what is 'natural' and determine how natural approaches can be applied within urban contexts. Natural features and processes are translated into measurable parameters, technical objectives and quantitative targets. For example:

- A CRC for Water Sensitive Cities publication on improving the ecological function of urban waterways (Beesley *et al* 2018) identifies nine attributes to guide the repair or design of a living stream site on a flowing urban waterway, including repairing flows, geomorphology, connectivity, riparian function, water quality and biota which are all fundamentally based on restoring pre-European river systems.

- A recent Western Australian stormwater management guideline recommends mimicking natural hydrology as one of five fundamental approaches to stormwater management: "When designing or assessing a stormwater management system… scientific and case study investigations find that when stormwater management systems mimic natural hydrological processes, the best economic, social and ecological outcomes are achieved." (Department of Water and Environmental Regulation 2017, p.6).

- Kermode *et al* (2020) describe how the Urban Streamflow Impact Assessment approach "begins with the identification of waterway values (social, ecological and geomorphic) then explicitly links these values to streamflow characteristics using hydraulic and hydrologic metrics."

This quote from Kermode *et al* (2020) refers to 'waterway values' as the starting point, and this is where river dreams come in. When our values are social in nature (e.g. waterways as places for recreation) it is easy to relate them to the concept of river dreams. However, even when our values are ecological or geomorphic, they can also be seen as a form of river dream. If our overall goal is restoration of natural values, we need to define what is meant by 'natural', and this is in essence an imagined set of conditions. The conditions that existed before European settlement are often the imagined ideal, yet due to the scale of transformation of waterways since colonisation, there is a lack of detailed knowledge of pre-European waterways and their

hydrology, vegetation and geomorphic form. 'Dreams' are required to fill this gap and these dreams are reflected in the design, targets and development controls that we set for these waterways.

River dreams in greenfield development

Our imagined ideal of a healthy waterway tends to be a waterway devoid of human intervention. Our views of natural waterways are strongly informed by personal engagement with the natural beauty of creeks and rivers in national parks, wilderness areas and nature reserves. However, waterways within national parks sit within a very particular context. This is one of extremely limited human presence, with little or no urban or rural development. Yet when we seek to restore urban waterways we often seek to also restore this *particular context* – waterways without people and *without* any form of intervention.

This form of contemporary river dream has been clearly expressed in recent greenfield developments. Riparian vegetation is typically protected and restored, minimising public access, and the waterways themselves are typically retained in their 'natural' form, albeit often highly degraded from previous agricultural land-uses. Features such as streets, paths, stormwater treatment systems and open parkland areas are set back from waterways (in NSW, the Natural Resources Access Regulator (NRAR) sets specific requirements limiting development on land adjacent to waterways). A key component of NRAR's guidelines is to keep activities out of the riparian zone by prohibiting almost any urban embellishment and thereby creating a sharply distinct relationship between the adjacent urban development with people and the riparian zone without people. A typical example is shown in Figure 1.

Figure 1. Second Ponds Creek, Western Sydney (Image: Urban Growth NSW)

River dreams in urban renewal

Urban development in Australian cities is shifting from greenfield development to more urban infill. When it comes to urban renewal or 'brownfield development' of older urban areas in Sydney, many former industrial areas are being redeveloped as mixed-use precincts. In these areas, many waterways have been so heavily modified that they have little natural value remaining. Creeks have been piped and channelised, wetlands have been drained and reclaimed. Riparian vegetation has been removed and urban infrastructure built directly adjacent to waterway corridors. Past development often extends to the very edges of channels and over piped watercourses, and there are limited opportunities for these highly urbanised and degraded waterways to 'mimic nature'.

In stark contrast to greenfield developments stream dreams are typically absent or only partly formed for these highly urban waterways. Hidden from view, these waterways lack a place in the public imagination. So degraded that any restoration would seem tokenistic, they also tend to lack significance to waterway

managers. Our recent research into development controls in Sydney (McAuley and Davies 2020) found that this distinct lack of vision translated directly into a lack of development controls for urban channels and waterways.

Therefore, when private land is redeveloped around these waterways, what we create around these waterways tends to be very limited. New development may have to be set back from channels and excluded from easements to allow for maintenance of infrastructure and safe passage of overland flows, however a restoration paradigm provides little other guidance for how to address and modify the urban interface with these waterways. In the absence of any vision or guiding principles to create any other outcome, our dreams remain stunted. Pipes remain underground, channels remain fenced and development continues to turn its back on these assets. Development responses continue to include covering existing channels.

River dreams in the public domain

Despite the challenges imagining new dreams for highly degraded waterways in brownfield areas, there are some waterways in inner and middle urban areas where new dreams are emerging. Many urban waterways, even though degraded, do occupy a significant place in the public imagination. The Cooks River is one example, where the river is set within a significant parkland corridor, and is therefore highly visible within an area well-used by the local community. Other waterways are less prominent, but still attract interest from communities keen to realise more value in these public assets.

Infill development is bringing increasing density, increasing demands on public open space and changing recreational preferences to Australian cities. Two emerging dreams for urban waterways are taking place against this backdrop:

1. Where waterways have been channelised, **'naturalisation'** (or even 'daylighting' of piped waterways) has become a dream considered worth striving for. Consistent with the ecological engineering approach discussed above, this dream is strongly informed by the dominant paradigm of mimicking nature. Sydney Water has now completed several waterway naturalisation projects in Sydney's inner west, where concrete channels have been replaced with 'naturalised' banks. In most of these cases there has been limited opportunity to expand the waterway cross-section or modify its alignment, so banks still need to be armoured, however natural materials are used in preference to concrete, and vegetation is included where possible. In many cases, concrete has remained in place on the stream bed and in some, fencing has remained in place at the top of the bank. These examples show how it is possible to restore some natural elements to these waterways, even though they remain very strongly shaped by their urban context. It is also becoming clear how much value local communities see in these projects. Fitzgerald *et al* (2018) assessed Sydney Water's Cup and Saucer Creek project to better understand its contribution to liveability, identifying improved amenity, community wellbeing, productivity and sustainability.

2. The **'green grid'** concept in Sydney's regional and district plans would unlock missing links, improve access to open space, and provide quality new recreational opportunities. The concept has captured imaginations, and some communities have turned their attention to 'forgotten' waterways as potential green grid links. In Sydney, Rushcutters Creek in Paddington and Iron Cove Creek (Dobroyd Canal) in Ashfield/Haberfield are two examples that have sparked recent community interest. At face value, these dreams are less about mimicking nature and more focused on access and movement, however an element of the green grid dream is about access to 'nature' within urban areas. There is an expectation that green grid links should include natural elements and provide an experience in 'nature'. Even though the environment may be highly modified, people still value the opportunity to be immersed in modified ecosystem, with a range of flora, fauna, and dynamic natural elements including water.

Both these examples begin to suggest how community visions for sustainable and liveable places often seamlessly blend dreams to naturalise waterways with dreams to improve access, movement and

recreational opportunities. For example, the concept design report for Small Creek (City of Ipswich, 2017) describes the project as transforming Small Creek from a concrete drain to a "natural waterway". When it discusses the values and benefits of a natural waterway, it identifies a blend of ecological and liveability outcomes: "Small Creek offers a unique opportunity to enhance the natural beauty of the area, improve waterway health and provide better active transport options and connection networks for the community." (City of Ipswich 2017, p.8).

There is potential tension between waterway restoration and access/recreational use. With limited space available along urban waterway corridors, and open space generally in high demand for recreational use within inner and middle suburbs, waterway restoration competes for space. When waterway professionals approach these projects with a strong ecological engineering mindset, they may view access and recreation in conflict with goals to mimic nature and restore as much natural value as possible. For example, along the Cooks River, biodiversity fencing has been erected to prevent informal access to the water's edge – this is shown in Figure 2.

Figure 2. Biodiversity fencing at an informal access point along the Cooks River (Image: author)

Discussion: taking a longer view

From today's perspective, with the benefit of hindsight, we can see how Australian waterways did not always live up to the dreams imagined for them in the 19th and 20th centuries, and we can see the limitations of earlier dreams in terms of negative outcomes for our waterways. However, it is harder to see the effects of our current worldview. Because our current paradigm emphasises restoration of natural values, we tend to view the waterways we are creating as being as 'natural' as possible rather than inherently constructed. Our views of what are shaped by a particular historical and cultural context that often underpins our assumptions of natural waterways *and their context*. However, if history is any guide, future generations will view our current paradigm as part of the same spectrum in which we view earlier paradigms, and they will view today's waterways as the product of our dreams.

We might start to reframe our thinking with a fresh look at the land management practices of First Nations people in Australia. While we tend to think of pre-European conditions as a scenario in which waterways were shaped only by environmental factors, there is increasing evidence (as outlined for example by Pascoe, 2018 and Gerritsen, 2008) to indicate that many waterways in Australia were significantly modified by Aboriginal people. The Brewarrina fish traps, shown in Figure 3, are one example. The extent of modification

of the waterway in this instance is impressive. Pascoe notes that "Charles Sturt saw weir and sluices on almost every flowing river".

Figure 3. Brewarrina fish traps (Image: Gilligan 2018)

The scale of intervention can be seen also in another example on the Murray River: "a series of dykes [were] placed across the Murray River floodplain to prevent it from receding too quickly during summer and thus ensuring retention of fish stocks. The dykes built from vast quantities of clay were over a metre high and extended along the river as far the as the reedy plains extended" (Pascoe, 2018 p.69). Pascoe (2018) also highlights a number of waterways which were significantly altered from 'natural conditions' including an example at Toolondo which had two wetlands connected by a 1.2 kilometre, 3 to 4m wide channel and an example of the flooding of the previously dry Lake Condah 8,000 years ago by drainage channels.

If we recognise that all urban waterways are the product of our dreams and shaped by design, and revisit the approaches to waterways in different urban contexts, we may be encouraged to look at our approaches in a new light:

- In greenfield areas, we might consider a greater diversity of potential outcomes. In many greenfield areas, waterways and their riparian zones take a significant amount of land, and require significant investment in restoration and ongoing maintenance. Therefore, design decisions deserve appropriate consideration commensurate with this level of investment.

- In urban renewal areas, even where there is little or no value in attempting to restore natural features in these highly modified waterways, we might be able to contribute to a more meaningful dialogue about improving liveability around these waterways.

- In the public domain, we may be better able to listen and understand communities' dreams for these waterways, where natural and anthropogenic values are blended and inseparable. We may then be able to have a diverse dialogue about how these waterways are designed.

Conclusions

Looking back at the past two centuries of urban development, Ian Tyrrell shows us that renovation is exactly what we do when we design waterways "…to realise certain environmental dreams... additions reflect environmental sensibilities that are embedded in particular and historically bound human valuations of nature. Always the outcome is a renovation, not a restoration of some pristine landscape" (Tyrrell, 2018 p.13).

If we're cognisant of our current 'ecological engineering' paradigm and how it shapes our dreams for urban waterways, we may also be able to see it as part of a longer series of evolving paradigms and design approaches to urban waterways, which have shaped them according to a human aesthetic. Then, we may also be able to move beyond a position where natural and anthropogenic values are seen inherently in opposition, to be better placed to fully comprehend emerging community waterway visions and help them take shape.

We might also revisit what we can learn from First Nations Australians and their approaches to land and waterway management. Rather than aiming to restore an imagined set of pre-European *conditions*, we may instead be able to restore *ways of knowing,* which saw people as belonging to and caring for Country.

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References

Beesley, L., Middleton, J., Quinton, B. and Davies, P.M. (2018). Improving the ecological function of urban waterways: A compendium of factsheets. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.

City of Ipswich (2017) Big Plans for Small Creek: Small Creek Channel Naturalisation Concept Design Report. Online: https://www.ipswich.qld.gov.au/__data/assets/pdf_file/0007/75733/Big-Plans-for-Small-Creek-public-document_B574.pdf [accessed 12 May 2021].

Department of Water and Environmental Regulation 2017, Decision process for stormwater management in Western Australia, Department of Water and Environmental Regulation, Perth.

Fitzgerald, S.K., Cunningham, D. and Birtles, P. 2018 "What next for liveability? Learning from the past and prioritising for the future" *Water* e-Journal Volume 3 No 1 2018. Online: https://watersource.awa.asn.au/environment/built-environment/what-next-for-liveability/ [accessed 12 May 2021].

Gerritsen, R. (2008) *Australia and the Origins of Agriculture*. BAR Publishing.

Gilligan, I. (2018). Agriculture from Africa to Australia. In *Climate, Clothing, and Agriculture in Prehistory: Linking Evidence, Causes, and Effects* (pp. 174-184). Cambridge: Cambridge University Press. doi:10.1017/9781108555883.014

Kermode, S. & Vietz, Geoff & Tippler, Carl & Russell, Kathryn & Fletcher, Tim & Sterran, Marlène & Birtles, Phillip & Dean, Michael. (2020). Urban Streamflow Impact Assessment (USIA): a novel approach for protecting urbanising waterways and providing the justification for integrated water management. *Australasian Journal of Water Resources*. 1-11. 10.1080/13241583.2020.1824330.

McAuley A. & Davies P J (2020) Standardising the standards Discussion Paper, step 4 of the Parramatta River Masterplan. Draft Report prepared for Sydney Water Corporation and the Parramatta River Catchment Group. February. Available online: https://www.ourlivingriver.com.au/content/uploads/2020/04/Final-Discussion-Paper-002.pdf.

Nathan, E (2007). *Lost Waters: A History of a troubled catchment*. Melbourne University Publishing.

NSW Government (2020) Mamre Road Precinct Draft Development Control Plan. November 2020. Online: https://shared-drupal-s3fs.s3-ap-southeast-2.amazonaws.com/master-test/fapub_pdf/00+-+Planning+Portal+Exhibitions/Draft+Mamre+Road+Precinct+Development+Control+Plan.pdf [accessed 12 May 2021]

Pascoe, B. (2018). *Dark Emu*. Scribe Publications.

Tyrrell, I. (2018). *River Dreams: the people and landscape of the Cooks River*. NewSouth Publishing Sydney.