

# **Rivers, art and amenity: the geomorphologist's role in health and well-being**

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## **Key Points**

- Liveability has become an important focus of attention in Australia's major cities and is influencing the objectives of river management
- Geomorphology has traditional linkages to social sciences and the arts
- Geomorphology provided a framework for enhanced appreciation of art relating to water and waterways in Australia and India in the recent 'water+wisdom India Australia' exhibition
- Through a combined analysis of geomorphology and aesthetics, it was possible to identify some key assumptions about 'sense of place' that underpin waterway management and design in Melbourne
- A holistic understanding that draws together physical, social and aesthetic perspectives is necessary to provide a sound basis for multi-objective river management that provides benefits for human health and well-being

## **Abstract**

River management in Australia has seen many shifts in objectives and priorities. Initially, the main emphasis was on water supply, then sewage disposal, flooding, drainage, stability and riverine ecosystems. In more recent years, liveability has become an important focus of attention in Australia's major cities, and this is influencing the objectives of river management. Geomorphology in Australia arose from geography, a broad discipline with its roots in both the physical and social sciences. This paper explores the contribution that geomorphology can make to the understanding and management of rivers for human health and well-being. Issues considered in the paper include the relationship of geomorphology to aesthetics, amenity and sense of place, as well as implications of climate change, in the context of river management. Case study examples are presented relating to the representation of rivers in art and waterway management in Melbourne.

## **Keywords**

Geomorphology, art, amenity, liveability, health, wellbeing, aesthetics, 'sense of place'

## **Introduction**

The history of river management in Australia has seen many shifts in objectives and priorities. Initially, the main emphasis was on water supply, then sewage disposal, flooding, drainage and stability. In the 1990s, sustainable management of riverine ecosystems became part of the suite of river management goals. In more recent years, liveability has become an important focus of attention in Australia's major cities. In 2017, the *Economist* rated Melbourne as the world's most liveable city for the 7th year in a row (*Economist* 2017). Melbourne Water, the lead agency for waterway management in the Melbourne, has identified liveability as a significant consideration in their operations (Melbourne Water 2018). Liveability includes meeting basic social, environmental and economic needs as well as addressing community values and preferences for amenity, wellbeing and a sense of place.

Geomorphology is the 'study of landforms and their landscapes as well as the earth surface processes that create and change them' (International Association of Geomorphologists 2018). In Australia, the United

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Kingdom and Europe, geomorphology originated as a sub-discipline of geography. In the sphere of river management, there are close links between fluvial geomorphology and earth sciences, hydrology, ecology and environmental engineering. While geomorphology has leaned strongly towards physical geography, there have also been linkages to human geography, social science and the arts. For example, Finlayson and Brizga (1997) discussed the role of perception versus reality in determining geomorphological change from historical documentary records. Goudie (2002) examined aesthetics in relation to geomorphological outreach. More recently, Dixon et al. (2012, p.227) reviewed the 'complex and fascinating aesthetic tradition within geomorphology'.

This paper explores the contribution that geomorphology can make to the understanding and management of rivers in regard to aesthetics, amenity and sense of place. This question is discussed at from two perspectives: 1) the representation of rivers in art, and 2) the role of aesthetics and 'sense of place' in the management and design of waterways on Melbourne's volcanic plains.

## **Geomorphology and Art**

The author was invited to provide commentary on similarities and difference between Australia's and India's river systems for RMIT's 'water + wisdom Australia India' exhibition and symposium (RMIT Gallery 2018). The purpose of the exhibition was to explore how visual artists, writers and film makers in Australia and India tell the story of water stewardship. The artworks encompassed a range of media including paintings, prints, photographs, weavings (nets and eel traps), video and an augmented reality installation. The centerpiece of the exhibition featured a collaborative painting by Australian and Indian indigenous artists who separately began painting parts of the river system at opposite ends of the canvas and joined together in the middle to paint the main river channel.

The representation of rivers in art reflects the intersection of three major spheres: the nature of the river systems, human interaction with the river systems, and cultural and artistic traditions. Therefore, there are common elements but also important differences between the Indian and Australian artworks.

Australia and India share an ancient linkage as adjacent parts of the former supercontinent Gondwana 200 million years ago. Now in different hemispheres due to continental drift, there are geological and geomorphological similarities between Australia and the Indian peninsula that have been attributed to their shared Gondwana origin. However, collision of the Indian Plate with the Eurasian Plate led to the formation of the Himalayas. As a result, the rivers of northern India, including the Indus and Ganges, are very different to Australian rivers.

An understanding of geomorphological similarities and differences between Australia and India provided the viewers of the exhibition with a better understanding of the context of the artworks in the exhibition. For example, the Augmented Reality Sandbox by Mark Ashkanasy, 2017, illustrated the effects of changing landforms on rainfall and runoff, demonstrating universal geomorphological and hydrological principles. Paintings of patterns of water in pools or videography of water flowing across riffles reflected on shared experiences that were relevant to both Australia and India. However, prints of the River Ganga were uniquely Indian.

## **Geomorphology, Aesthetics and 'Sense of Place' in Melbourne's Volcanic Plains Streams**

The Melbourne metropolitan area covers an area of nearly 10,000 km<sup>2</sup>. Its heterogeneous landscapes span at least four major geological and geomorphological provinces including:

- Quaternary volcanic plains to the north and west of city ('volcanic plains');

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- Silurian sedimentary hills to the east of the city;
- The 'sand belt' associated with Tertiary and Quaternary sediments to the south-east of the city; and
- The Dandenong Ranges and foothills to the far east of the city.

There are also significant local variations in climate across the Melbourne metropolitan area. Mean annual rainfall ranges from less than 600 mm to the south-west of the city to over 1000 mm on Dandenong Ranges (Bureau of Meteorology 2010). The volcanic plains have relatively low rainfall compared to other parts of the Melbourne metropolitan area. Natural vegetation also varies significantly across the city, as shown by bioregional and ecological vegetation class (EVC) mapping (DSE 2007). The volcanic plains were naturally characterized by extensive grasslands.

The waterways flowing through Melbourne's mosaic of landscapes includes the Yarra and Maribyrnong Rivers, their tributaries, and a number of smaller streams that discharge directly into Port Phillip or Western Port Bays. Melbourne's waterways have diverse natural geomorphological characteristics, reflecting the variations in geology, topography, catchment area, climate and vegetation. From the viewpoint of Melbourne's rivers and waterways, 'sense of place' (based on those characteristics that make a place special or unique) varies across the Melbourne metropolitan area according to the local waterway attributes. The waterways and associated landscapes vary in terms of their aesthetic values, with some being perceived as more attractive and making a greater contribution to amenity than others.

Historically, urban development spread preferentially to the hills and sand belt to the south and east, which are characterised by higher rainfall, more varied topography and proximity to beaches on the eastern shores of Port Phillip Bay. Property values are typically higher in these established areas. Extensive new urban development is currently taking place on the volcanic plains to the north and west of Melbourne.

In the nineteenth century, the volcanic plains were a source of fascination for artists and designers, although their focus was drawn to the eruption points rather than the minor streams. For example, the famous colonial artist, Eugene von Guerard, painted numerous views of Victoria's volcanic plains. William Guilfoyle, the architect of the Royal Botanic Gardens, Melbourne, styled the water supply dam for the Gardens into a feature known as 'Guilfoyle's Volcano', with lawns sloping away from the 'volcano' that were designed to imitate the form of lava flows (Royal Botanic Gardens Victoria 2015).

The major streams on the volcanic plains have deep and spectacular valleys (e.g. Maribyrnong River at Brimbank Park) but many of the smaller drainage lines are occupied by ephemeral rocky creeks or shallow ephemeral wetlands. These small drainage lines present challenges for establishing new urban developments addressing community and developer expectations regarding the provision of aesthetically pleasing waterways that contribute to the amenity of residential estates and the parklands and trails that often border the waterways. 'Blue space' is thought to contribute to health and well-being in urban settings (Foley and Kistemann 2015).

The ephemeral rocky creeks present a dilemma that highlights the interface between geomorphology and social considerations. These creeks have a characteristic stream form associated with the volcanic plains and their bedrock substrate can be expected to remain stable even when subject to increased flows resulting from urban runoff. However, the ephemeral rocky creeks contribute little, if any, blue space to the local urban environment as they do not hold water except during storms, when flash flooding may pose a public safety hazard. Features such as permanent pools can be challenging to achieve in these relatively low rainfall areas, and may become more difficult to sustain with climate change.

The ephemeral rocky creeks are consistent with the 'sense of place' of the volcanic plains. However, the lay person may have a more generic view of the 'sense of place' of Melbourne's waterways based on the larger rivers and streams in the wetter parts of the metropolitan area. On this basis, developers often consider that

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the ephemeral rocky creeks of the basalt plains will not conform with the desires of residents moving into these areas, and may seek to modify the streams to conform to perceived expectations.

The ephemeral wetlands pose an even greater challenge if increased catchment runoff due to urbanization requires channelisation, as the substrate may consist of sodic, dispersive soils, in which case the provision of effective drainage and establishment of a stable waterway can present a major challenge. The establishment of aesthetically pleasing pools is especially difficult as not only is the water supply limited, any water that is present will be subject to prolonged turbidity if it is exposed to the dispersive soils.

Currently, there is an emerging interest in using the indigenous plants of the volcanic plains as garden plants, suggesting a strengthening interest in the local volcanic plains environment. A greater understanding of the natural diversity of Melbourne's waterways and the distinctive aesthetic values of the volcanic plains streams may lead to increased appreciation of their geomorphological character.

## Conclusions

In recent years, the goals of waterway management have expanded from utilitarian to ecological and more recently are also seeking to address social objectives. Australian geomorphologists working in waterway management have established close collaborations with other scientists and engineers, although geomorphology also has long-established linkages to human geography, social science and the arts. This paper has examined two case studies that assist in exploring the potential for collaborations with artists and social scientists. Bringing together perspectives from these different disciplines provides a more holistic understanding of our interactions with waterways at a broad scale, as illustrated by the 'water + wisdom Australia India' case study, as well as in regard to waterway management, as illustrated by the discussion of the waterways of Melbourne's volcanic plains. There is further scope for such collaborations to be extended, enabling our understanding of waterways to be enriched, and our management of waterways to be improved.

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