Digital River Outputs as a Framework through which to Weave Multiple Knowledge Forms
Les données numériques des rivières comme cadre pour tisser des formes multiples de connaissances

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RÉSUMÉ

Les conditions géologiques et climatiques qui dictent le fonctionnement des systèmes évoluent. Pour suivre le rythme de ces taux et amplitudes de changement sans précédent, les modes de vie et d'interaction des gens avec les paysages doivent s'adapter. Nombreux sont ceux qui ont suggéré la nécessité de créer des liens émotionnels plus forts avec les paysages pour permettre la formation de relations symbiotiques et une compréhension plus nuancée. Les récits fluviaux sont un outil utile pour faciliter ces relations réciproques. Ainsi, cet article propose une approche pratique pour l'utilisation des données numériques des rivières comme cadre informatif permettant de tisser diverses formes de connaissances et de (re)raconter les récits des rivières. Nous nous appuyons sur une ontologie « au-delà de l'humain » pour représenter le bassin versant sur différentes échelles spatio-temporelles, en accord avec l'approche de la philosophie du processus suggérée par Whitehead (1978) et développée par Rhoads (2006). Cette analyse approfondie des processus et les comparaisons avec la rivière elle-même, plutôt que l'établissement de directives prescriptives et générales, permettent d'apprécier les complexités des paysages fluviaux, ancrées dans des contextes locaux et spécifiques.

ABSTRACT

The geologic and climatic boundary conditions which dictate the manner in which systems function are changing. To keep pace with such unprecedented rates and extent of change, the ways in people live and interact with landscapes must adapt. Many have posited the need for greater emotional connections to landscapes to allow the formation of symbiotic relationships and greater nuance of understanding. River stories are a useful tool in which to facilitate such reciprocal relations. Thus, this paper suggests a practical approach for the use of digital river outputs as an informative framework through which to weave multiple knowledge forms and (re)tell river stories. We draw on a more-than-human ontology in efforts to represent the catchment over varying spatio-temporal time scale that align with the process philosophy approach suggested by Whitehead (1978) and built upon by Rhoads (2006). The resultant deep analysis of process and comparisons with the river itself, rather than sets of prescriptive and broad guidelines, allows for the appreciation of riverscape complexities that are place-based and contextualised.

1   A NEW TRAJECTORY

Rivers in Aotearoa New Zealand are dynamic and complex. Most rivers are steep but short with the axial ranges guiding drainage mostly east-west. Despite its small size, the vastly varied landscapes in New Zealand also act to produce diverse river types (Brierley et al., 2022). Yet both the geologic and climatic boundary conditions which dictate the manner in which these river systems function are changing. Riverscapes have become 'domesticated' whereby intentional and non-intentional human interventions have created an environment best suited to the provision of human needs (Erickson, 2008). To keep pace with such unprecedented rates and extents of change, the ways in which people live and interact with riverscapes must adapt. To do this an analysis of how we know our rivers and what we do with this information is critical.

2   CONVERGENT SPACES

As the subject of geomorphology progressed into the 21st century, remote sensing, computation and absolute dating techniques evolved. Becoming increasingly theoretical and abstracted from place (Blue, 2019), more value was placed on the collection of Big Data. Digital rivers, artificial rivers constructed using computers, (Goodchild, 2012) began to be created in order to answer what-if scenarios and explore form-process linkages (Brown & Pasternack, 2019). They allow for analysis over differing spatio-temporal scales (Figure 1) and a more complete understanding that cannot be ascertained from fieldwork alone. Thus, understanding complex and significantly changing riverscapes must utilise the most appropriate technologies (Piegay et al., 2020). A combination of perspectives and tools is usually most useful as it allows geomorphologists to broaden their spatial and temporal perspectives (Piegay et al., 2020). Yet, often concerned with micro-scale processes, digital rivers have regularly fallen into the trap of becoming overly embedded in mechanistic materialism characteristic of process geomorphology. Mechanistic materialism proposes that all phenomena are constantly in the process of becoming as they futilely attempt to attain an 'ideal' form (Rhoads, 2006).
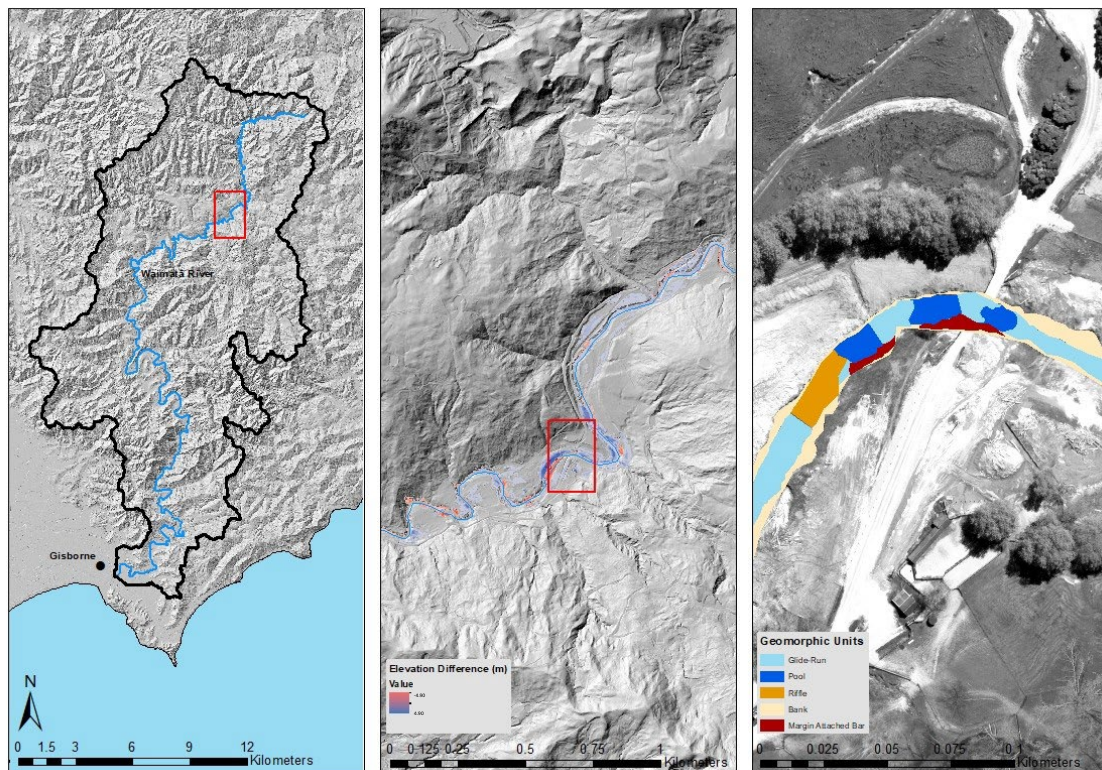

Figure 1. Using the Waimatā Catchment in New Zealand's North Island as an example, using differing Digital River techniques to work across scales is depicted. Left panel – catchment scale, Centre panel – Reach scale (Geomorphic Change Detection results), Right panel – Unit Scale (Geomorphic Unit Toolkit Results).

Thus, we consider another (often considered opposing) way of knowing rivers in New Zealand. Māori, the indigenous people of New Zealand, know rivers as ancestral beings with their own life and power (Hikuroa et al., 2021) forming part of a connected environment that they too are a part of. People and the land are inseparable. Such a perspective must be understood through a more-than-human lens in which relationships between the human and non-human are considered (Abram, 1996). In order to draw on these multiple knowledge forms to inform practice (i.e. living generatively with rivers) a coherent information base is required.

3   STORYTELLING

Storytelling, or river stories, could provide such coherence. Not constrained to a singular medium, they are telling of the lived histories and experiences of the river itself and those living alongside. River stories can act as a convergent space to understand the dynamic processes that make up a riverscape. They allow for the diversity of the river system to be respected and 'worked with' in a way unique to its characteristics (Fryirs & Brierley, 2021). The information comprising an individual river story is reflective of 'what matters' and why in a particular system. This approach reflects more-than-human ideals by conducting research from the 'mountains to the sea' with place-based knowledge of process and process-born morphology, extending past static mechanistic materialism. The generation of a river story requires careful consideration not only of what story to tell but also how best to tell it.

4   COMMUNICATION

The way in which river stories are told and communicated is critical to what is heard and how information is used. Geomorphologists and other river practitioners hold responsibility for communicating the findings of their research to inform practice (Brierley, 2009). The intense domestication of the majority of riverscapes positions them as outcomes of socio-ecological process (Comby et al., 2019). Therefore, the discourse we use to represent them and the context in which they are described affects how we live with them (Ashmore, 2015) and is itself a social act (Fairclough, 2010). Given the importance of communication, we must find ways to interrogate its adequacy in conveying intended messages. Utilising a more-than-human approach, the process of doing geomorphology and other pursuits which aim to live more generatively with rivers, should not enact top-down forcings in which 'science knows best'. Instead, we seek to entwine the human and non-human through the weaving of multiple knowledges and cultivating bottom-up engagement. Put simply, working with those who the information is intended for to make it work best for them and their river system. Landscapes should be though of as a combination of interconnected processes and histories of both the human and non-human (Haraway, 2016) to allow for robust and equitable riverscape learnings (Koppes, 2022). The combination of digital rivers with other knowledge forms best suited to the specific riverscape can create a river story capable of providing the information required to live generatively within it.

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