Project Summary 2018-19

Geomorphic change & disturbance thresholds for the protection or recovery of stream form in urban catchments

Project A3:
Channel Prediction

This project will develop physical form predictive tools to inform land development policy and planning, support delivery of HWS objectives and increase understanding of the Levels of Service that could be supported by streams draining urban catchments.

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Catchment urbanisation has profound effects on the physical form and function of stream channels, with far reaching economic, ecological and social implications for our cities and suburbs. The two main drivers of this change are flow and sediment inputs.

Recent studies have greatly improved our understanding of these relationships, however, there is currently no accepted model for the expected extent and severity of channel change relative to catchment characteristics, e.g. imperviousness or topography. Nor do we have an ability to predict channel physical recovery in the event that flow regime management reduces input stressors. This hampers our potential to plan for channel change, and limits our ability to demonstrate the benefits of moving away from business-as-usual.

The understanding from this project will be used to develop relationships and catchment-scale models that inform a predictive tool for the management of river physical habitat.

Methods

This project will utilise spatial datasets, including LiDAR to develop space-for-time substitution regression models for urban development scenarios relative to channel morphology. Predictive models will draw upon recent research on geomorphic sensitivity and PhD research demonstrating hydraulic condition changes in channels as they relate to levels of urban hydrology.

The approach is an advancement of the 'regime equations' that link changes to basic discharge characteristics to channel metrics.

Field studies undertaken at a broad scale will be used to verify channel morphology and characterise indicators of channel change i.e. erosion/deposition and substrate sediment prevalence. An approach to developing 'appropriate' levels of hydrologic change will be developed based on associations between hydrology and channel change. The findings from field studies undertaken in Project B1:StreamFlows will be incorporated where possible. Application of this approach is intended for the Melbourne region (including the rapidly developing Sunbury area).

Outcomes

The project will develop:

1) an understanding of the change in stream physical form relative to urbanisation,

2) a tool to assist with planning and development applications to identify the extent of impacts of development scenarios and the riparian land required (i.e. floodplain space), and

3) an understanding of the level of intervention required (i.e. flow controls) to achieve post-development, sustainable physical form of streams that are capable of supporting values in the long-term.

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