HYDROLOGICAL IMPACTS OF URBAN DEVELOPMENT IN THE ALBANY BASIN, AUCKLAND.

A thesis presented in fulfilment of requirements for the degree of Doctor of Philosophy in Geography.

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HAPPINESS

John had
Great Big
Waterproof
Boots on;
John had a
Great Big
Waterproof
Hat;
John had a
Great Big
Waterproof
Mackintosh-
And that
(Said John)
  Is
  That.

A.A. Milne

ABSTRACT

In several areas of Auckland, urban development has resulted in flooding and siltation problems that have been both difficult and expensive to manage. This study investigates the fluvial processes of runoff and sediment generation with a pastoral catchment of the Albany Basin and assesses the potential hydrological impacts of urban development with its catchment area. During the study period this catchment was on the fringe of the urban development of Auckland's North Shore.

By examining the factors that control runoff and sediment generation within a pastoral catchment, site information that may be useful for controlling runoff and sediment generation within an urbanised Albany Basin is gained. To assess the impacts of urban development, streamflows and suspended sediment yields from catchments representative of three different land uses are compared: pastoral, urban construction and developed urban. Stream channel enlargement indices for a number of nearby catchments with different proportions of urban land cover are also determined and compared.

The study shows significant increases in stormflows and suspended sediment yields from catchments that are either fully developed or undergoing construction for urban use. But due to the relatively dry weather experienced during the study period these results are thought to underestimate the impact of urbanising the Albany Basin. The investigation of stream channel enlargement shows that for totally urban catchments stream channel cross-sectional areas may be nearly three times those for pastoral catchments.

Methods for controlling the impact of urban development on streamflows, sediment yields and channel enlargement are discussed. It is proposed that by developing techniques where by storm runoff is dispersed and stored within the considerable soil moisture storage capacity of an urban land cover, of the type planned for the Albany Basin, that a considerable reduction in stormflow and sediment generation may be achieved. The study concludes that through careful land use planning and the use of appropriate control structures the impacts of urban development may be reduced to acceptable levels.

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