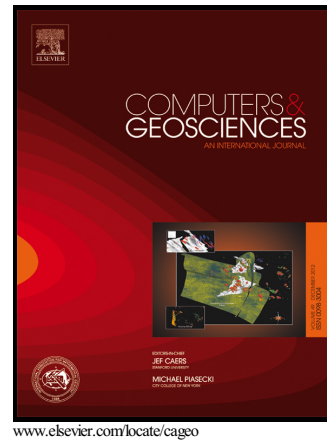# Author's Accepted Manuscript

Consideration of optimal pixel resolution in deriving landslide susceptibility zoning within the Sydney basin, new south Wales, Australia

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1 Consideration of optimal pixel resolution in deriving Landslide Susceptibility

2 <u>Zoning</u> within the Sydney Basin, New South Wales, Australia.

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Abstract

7 This paper discusses the progress of the landslide susceptibility mapping in the wider Sydney Basin

8 area to facilitate engineering and geological studies and land-use zoning; using induced decision trees.

9 This study investigates the effect of the basic unit of this spatial modelling work (pixel resolution) on

10 the accuracy of the modelling outcome, and reports on the effectiveness of using See5 pruned

11 decision trees to model the landslide susceptibility of the Sydney Basin. Landslide susceptibility was

12 determined from the landslide confidence value derived from the Laplace ratio of the rule based

13 predicted classes. The modelling work has been carried out at 2m, 5m, 10m, 15m, 20m, 25m, 30m,

14 and 40m pixel resolutions for a trial area within the Sydney Basin. Ten different GIS based datasets

15 derived from the same original datasets have been used each time as landslide causative factors. The

16 optimum tree pruning parameters for each pixel resolution were identified by analysing the behaviour

17 of misclassification errors. Performance of the models at different pixel resolutions was compared

18 using ROC curves and five-fold cross validation accuracy. High density ALS elevation point clouds

19 and large scale datasets allowed model development at a higher resolution (2m) but the decision tree

20 model at 10m resolution performed better than the rest. The ratio between the square root of the mean

21 landslide area of the inventory and the area covered by a single pixel has been developed as a

22 worthwhile quantitative measurement of the adequacy of the model resolution. The validation results

23 of the final modelling outcome show that landslide susceptibility descriptors fulfil the requirements of

24 the LRM guidelines. The model has a conservative success of 90% according to the field validation

25 and a cross validation accuracy of 92%.

26 Keyword: Landslide Inventory, susceptibility modelling, pixel resolution, See5, decision tree, GIS