Drainage Density as Rainfall Induced Landslides Susceptibility Index in Small Catchment Area

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5 Relation between drainage density and rainfall index $R'$

Fig. 5 shows relation between drainage density and rainfall index $R'$. Lowest value of $R'$ decreases, as drainage density increases. This indicates that drainage density will be a good susceptibility index for rainfall-induced landslides and debris flows in small catchment area.

![Fig 5. Relation between drainage density and rainfall index $R'$](image)

6 Conclusion

Drainage density is easy to measure without field survey. Drainage density would be good index for estimating evacuation rainfall by small catchment-base where past disaster data are not available. Therefore, study of drainage density is practical approach for disaster management.

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References


4 Rainfall index $R'$

Rainfall indexes relating to rainfall-induced landslides and debris flows usually have two parameters: short-term parameter such as rainfall intensity and long-term parameter such as duration. These rainfall indexes are not applicable to comparison with drainage density. Therefore, a new rainfall index $R'$ proposed by Nakai et al. (2008) is introduced for this study. $R'$ has a single value comprising two kinds of influence by long term and short-term rainfalls (Fig.4)

$$R' = R_W - R_f$$

$$R_f = (R_l - R_i)^{2} + a^2 (r_l - r_i)^{2}$$

Where

- $R_w$: Long-term effective rainfall (mm),
- $R_f$: Short-term effective rainfall (mm),
- $R_l$: Point of reference on horizontal axis
- $r_l$: Point of reference on vertical axis
- $a$: Weight of coefficient
- $R_w0$: Value of $R_w$ when Long-term and short-term effective rainfall are zero

![Fig 4. Definition of the rainfall index $R_f$ and $R'$](image)