THE EROSION MODEL BASED ON GRAINSIZE DISTRIBUTION RATIOS OF WEATHERING PRODUCT OF QUATERNARY VOLCANIC DEPOSITS [1)]

Key words: erosion model, soil erodibility, Quaternary volcanic deposits

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INTRODUCTION

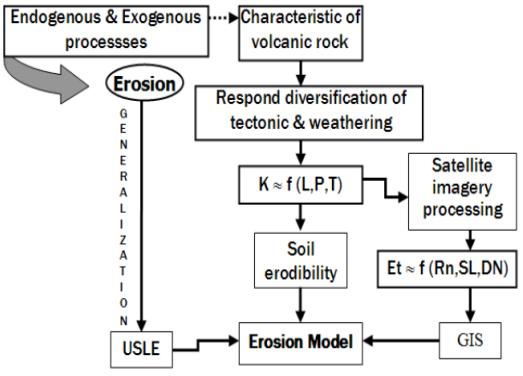
The intensity of erosion ≈ f (rainfall erosivity, soil erodibility, morphology, & land use)

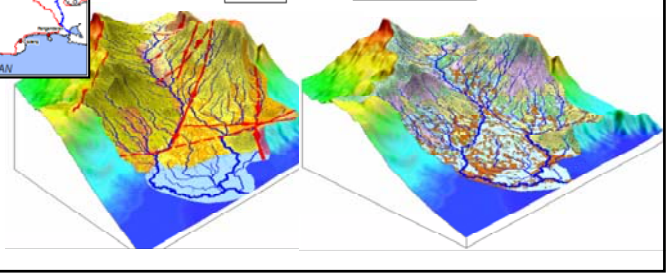
USLE
(Wischmeier & Smith, 1978)

Currently, the USLE applications cannot use for base assumptions, since the formula is no longer correct that causes wrong generalization

The Southern Part of Bandung Basin

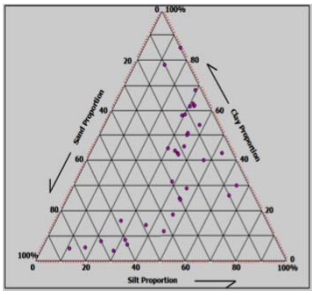
RESEARCH METHOD





The result of erosion calculation and their validation

Demonstration plot	Erosion (ton/year)	USLE					USLEv			
		USLE (ton/year)	ΔE	Proportion of ΔE	error	k	USLEv (ton/year)	ΔE	Proportion of ΔE	error
Upstream Cirasea	296.77	353.30	56.53	0.19		0.84	272.04	24.73	0.08	
Barugbug	81,844.70	99,810.63	17,965.90	0.22		0.82	76,854.19	4,990.51	0.06	
Cicangkuang	10,296.10	12,870.08	2,573.98	0.25		0.80	9,909.96	386.14	0.04	
Cirawa	216,421.92	281,067.46	64,645.54	0.30		0.77	216,421.94	0.02	0.00	
Sadatapa	68,376.35	91,168.44	22,792.09	0.33		0.75	70,199.70	1,823.35	0.03	
Wangisagara1	605.80	931.98	326.18	0.54		0.65	717.62	111.82	0.18	
Ciramose	2,851.14	5,001.99	2,150.85	0.75		0.57	2,551.01	300.13	0.11	
Malimping 2	8,128.00	15,335.90	7,207.90	0.89		0.53	7,821.31	306.69	0.04	
Malimping 1	7,821.30	15,335.90	7,514.60	0.96		0.51	7,821.31	0.01	0.00	
Galugah1	7,970.82	16,267.01	8,296.19	1.04		0.49	8,296.18	325.36	0.04	
Galugah13	395.65	879.24	483.59	1.22	0.61	0.45	448.41	52.76	0.13	0.06



$$E_v = k'\left(\frac{M}{S+C}\right) RKLSCP$$

Where:

E_v = erosion intensity in volcanic terrain in ton/ha/year;

k' = C-M-S ratio constant: 0.88 for high plasticity silt and 1.07 for high plasticity clay;

M = silt proportion in %, S = sand proportion in %, C = clay proportion in %;

RKLSCP = calculation factors of erosion for USLE

USLE modification

$$E_v = k\,[RKLSCP]$$

Where K = erosion coefficient of USLE; 0.51 for high plasticity clay (CH) and 0.77 for high plasticity silt (MH).

The $k_{M\text{-}C\text{-}S}$ correction for various land uses

Land use	CP	$k_{M\text{-}C\text{-}S}$			
		CH	MH	ML	SM
Residential area	0.60	0.41	0.62	0.64	0.26
Mixture farming & grove	0.30	0.20	0.31	0.32	0.13
Paddy field	0.05	0.03	0.05	0.05	0.02
Farming field	0.75	0.51	0.77	0.80	0.33
Plantation field	0.40	0.27	0.41	0.43	0.18
Forest	0.03	0.02	0.03	0.03	0.01

CONCLUSION

Residual soils originated from weathered Quaternary volcanic deposits in southern Bandung basin are highly plastic.

The result of validation of hypothesis using deterministic approach exhibits that ratio between fine-grained to coarse-grained soil fractions determines the soil erodibility.

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