Examination LANDDEGRADATION
Tuesday 8 November 2005
Duration: 9.00 to 12.00

At the end of the examination hand in all your answer sheet. Write down your STUDENT NUMBER ON ALL PAGES of your examination!

This examination consists of large number of questions. Do not loose too much time answering one specific question. Continue with the examination if you do not know one (sub)question.

Be CONCISE in your answers! (Dutch: BEN BONDIG IN HET ANTWOORDEN).

You are allowed to answer in ENGLISH or in DUTCH.

Please fill in the evaluation forms before leaving the room! Thank you for your cooperation.

Good luck.

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Question 1 (Total=15pnt; 3*5pnt)

The velocity of water flowing on a slope is often calculated with Manning's formula:

$$V = \frac{R^{2/3}\sqrt{S}}{n}$$

The detachment and deposition are often calculated with some form of the Gover's equation (where Y is some soil strength related parameter):

$$Df = Y(TC - C)v_s w$$

Name and describe 3 "conservation methods" with which farmers can reduce both runoff and sediment loss, and explain for each of these 3 their relation to two formula's above.

Question 2 (Total 15pnt; 3*5pnt)

Give 3 reasons why equations based on streampower give a better prediction of sediment transport capacity than equations based on shear stress.

Question 3 (15 pnt)

Calculate the strength of the following situation at the slipsurface with the Mohr-Coulomb equation.

$$\tau = (\sigma - u) \cdot \tan\varphi + C = \sigma' \cdot \tan\varphi' + C'$$

Slipsurface at 10 m depth, groundwater at 6m below surface. The soil consists of two layers of 3 and 10m thickness. The upper layer has a cohesion of 10kPa, angle of internal friction of 27°, the lower layer of 5 kPa and 35°. The dry bulk density is 17 kN/m^3 and wet bulk density kN/m^3.

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Question 4 (a to f; 6*5pnt=30 pnts))

Right or Wrong and EXPLAIN

a) A Mohr's circle describes the relation between the shear stress and the normal pressure at only one shear plane?

b) The largest shear stress (so the top of the Mohr circle) is where the failure occurs?

c) Water pressure decreases the material strength, and thus decreases the radius of the Mohr circle.

Answer the following:

d) What is a landslide trigger and what is a landslide cause?

e) It is generally believed that vegetation has a stabilizing influence on slope stability. Why can we still see quite some landsliding with a lot of healthy vegetation on top of it? Give two options for mass movement with vegetation.

Below some Mohr circles are drawn.

    f) Draw the Mohr-Coulomb strength envelope and draw the residual strength envelope. Indicate cohesion and angle of internal friction in the figure also.
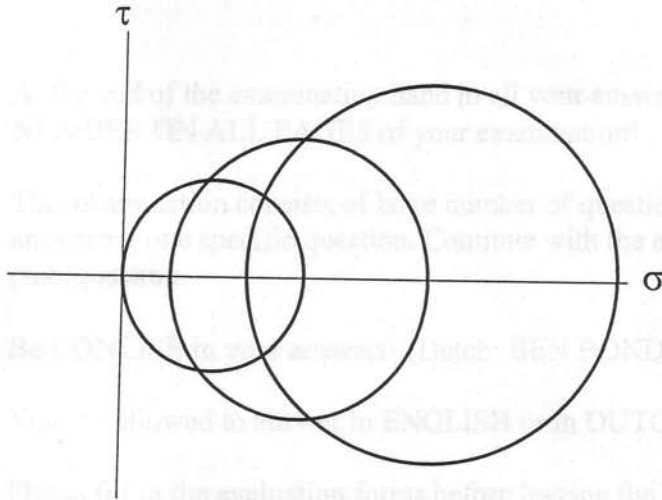
Question 5 (total 10pnt; a=6pnt, b=4pnt)

    a) Explain why dryland salinisation occurs at the moment more water is infiltrated into the soil?

    b) How can agroforestry reduce soil salinity?

Question 6 (Total 15 pnt)

The general equation for the determination of risk is a multiplication of 3 actors:

Risk = Hazard * Vulnaribility * Amount

Why can you not express risk as the sum of these three factors:

Risk = Hazard + Vulnaribility + Amount

(hint: a good way to explain is to give a simple example with imaginary values for each factor)