Mittuniversitetet
MID SWEDEN UNIVERSITY

Försättsblad Prov Original

Kurskod	Provkod	Tentamensdatum
MX003A	1000	2019-01-08

Kursnamn	Miljövetenskap AV, Metodik ur systemperspektiv
Provnamn	Tentamen
Ort	Östersund
Termin	
Ämne	

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Utskriven 2019-01-11 kl. 09:11:16

Exam for MX003A, Methodology from a systems perspective, 7,5 credits

Date: 2019-01-08
Time: 5 h
Aids: Language dictionary, calculator
Teachers: Erik Grönlund (070-392 24 81)
Instructions:
Mark each paper with the ***question number and your personal examination code that is provided to you.***
Maximum score 50 points (p). Minimum required score to pass 25 p.
Good Luck!
Erik

CHAINET report

Question 1. (10p). Types of systems analysis tools

a) Describe the difference between analytical and procedural systems tools, and give an example of each.

b) Describe the difference between function oriented and region oriented systems tools, and give an example of each.

Question 2. (5p). Describe the principal ideas behind CERA and TCA according to the CHAINET report.

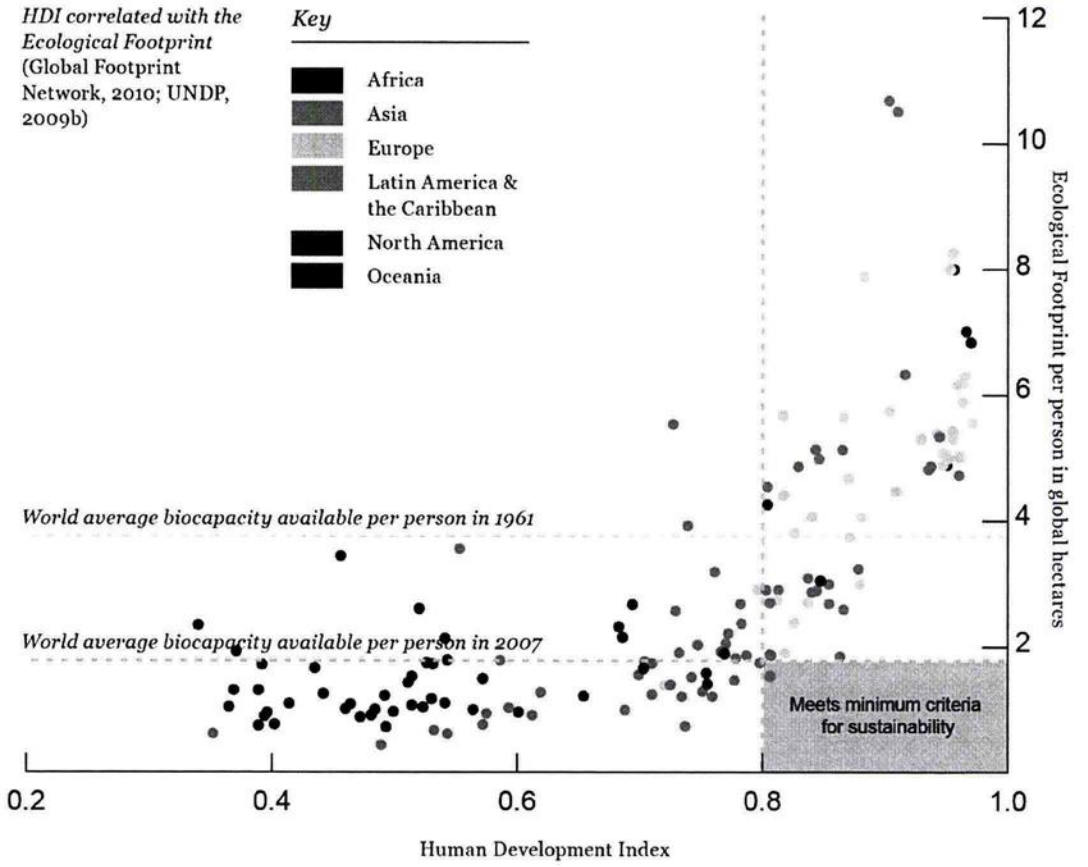
Methodology questions.

Question 3. (10p). Compare 5 methods from your environmental assessment toolbox, by presenting their major strengths and weakness'.

Question 4. (5p). You are working at the sustainability department at a company selling wind power and solar power equipment, and from the company CEO you are asked to suggest two methods to back up the company's claims of sustainability. Which two methods would you suggest, and why?

Question 5. (5p). You are working at a sustainability department at United Nations, and your boss ask you to suggest two methods to assess sustainability on the global level. Which two methods would you suggest, and why?

Question 6. (5p). In the Living Planet Report there is a map presenting "The footprint and human development". Explain the diagram, its principles and its result.



LCA applications

Question 7. (5p). Draw a flowchart for the following (simplified) industrial system:

A metal product, WS (a simple woodstove, see picture), is produced in plant Z, where metal sheets are cut and pressed to form the product WS. Plant Y delivers the metal sheets to plant Z. In plant Y, ingots are melted and rolled into sheets. The ingots come from plant X where iron mineral is extracted, turned into metal and cast into ingots. Plant X is situated 400 km from plant Y and the ingots is transported to plant Y by truck. Plant Y is situated 800 km from plant Z and the metal sheets are transported also to Z by truck. In the production of WS in plant Z there is also some process scrap (pieces of metal clippings from the cutting of the metal sheets). The process scrap is sent back to plant Y where it is melted together with the "new" metal and rolled into sheets.

The flowchart should include all the activities in the system. Each plant is to be considered an activity of its own. Also transportation is to be considered as an activity. It is not necessary to make a detailed description of all the process steps inside the plants. Represent the flow of material from plant to plant by arrows. Indicate what goes in (raw material) and comes out (product) from each plant.

Question 8. (5p). Perform data normalization at Plant X (from the previous question) for the following inputs and outputs according to the Annual environmental report for Plant X.

Annual environmental report for Plant X

Products from Plant X:	Metal ingots of iron (Product X)
Raw material to Plant X:	Iron mineral (raw X)
Total annual production:	1000 kg of X/year
Use of raw material:	4000 kg raw X/year
Use of energy in the process:	2000 MJ/year, from oil combustion
Emissions to air:	100 kg HCl/year (HCl = hydrochloric acid)
Emissions to water:	100 kg Cu/year (Cu = Cupper)
Non-hazardous solid waste:	3000 kg solid waste/year