Exam Marine Sciences II (2017)

Thursday 8 November 2018,
***Beatrix Theater* - 13.30-16.30h**

NB: Write your name and student number on each page you use! Pages without identification will not be considered

Answers can be in English or Dutch
Answers must be as synthetic as possible (to the point), do not use extra space than given if not strictly necessary

Please, write with a readable handwriting

Veel succes! Good Luck!

FRANCESCA SANGIORGI

Explanation grade and calculations

Every question is associated to a certain number of points (indicated after the question itself or at the beginning of each bundle of questions).
The sum of the points you can gain in each part if you add those points is not necessarily = 10.
However, each teacher/each part will be converted to a final mark between 0 and 10.

The normalized average of those marks will be your final mark for the exam.
The normalization is done in a way that the mark of a teacher who has taught only 1 block (3-4 hours) will be counted proportionally compared to the grade of a teacher who has taught 4 blocks (e.g., 1/4 and 1, respectively).

You will get a final mark, which considers the mark of the essay, only if the mark of this exam is >5.5 (sufficient)

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Questions Francesca Sangiorgi – excursion

1) *Hippophae rhamnoides* (Duindoorn/seabuckthorn) is a dominant plant in the coastal dunes. What statement is <u>completely</u> correct? (2 points)

a. *Hippophae* is a herb that is adapted to long droughts and very variable temperatures
b. *Hippophae* is capable of fixing nitrogen and therefore does well in the low nutrient dune sands
c. *Hippophae* is capable of growing in salty groundwater
d. *Hippophae* is has been specifically introduced by humans to fix the dune sands

2) Mark the correct statement(s) (more than one answer possible). 3 points are given ONLY when all the correct answers are identified

a) Seawater contains ~ 35 milligram salt/kilogram water
b) The more Na^+ and Cl^- ions in the seawater the higher the conductivity
c) Conductivity of seawater increases with temperature
d) The bounded oxygen molecule in the seawater (H_2O) does not count for dissolved oxygen level in seawater
e) Dissolved O_2 in seawater increases with temperature
f) When dissolved oxygen is about 10 mg/l waters can be considered hypoxic
g) Average pH of seawater in the ocean is about 7

3) Take a small basin – like a lagoon - only partly connected to the sea at high tides. What happens during periods of disconnection or minimal connection with the sea and maximum light intensity? Complete the sentences with the word "increases or decreases" and give a reason (3 points)

1) Nitrogen …….. because of

2) Phosphorous …… because of

3) Dissolver Oxygen in the water column ……. because of

4) pH ……. because of

5) Salinity ……. because of

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Questions Francesca Sangiorgi – excursion

4) The two-long term processes, which determine the present-day location of a coast, are (2 points)

…….

…….

5) Sea level: what is true? More than one answer can be correct (max 5 points)

a) Sea level was globally ~ 120 m below present day during the last glacial maximum (LGM)
b) When Antarctic ice-sheet melts, global sea level increases
c) When Greenland ice-sheet melts, global sea level drops
d) After Antarctic ice sheet formed, sea level mostly decreased close to the ice sheet
e) Sea ice contributes to eustatic sea-level change
f) Mean sea level has increased about 3.3 cm in the last decade
g) Eustatic sea level does not depend on thermosteric changes
h) Extraction of natural resources from below the sea floor causes global sea level to rise
i) If West Antarctic ice sheet melts, sea level at the Dutch coast will increase more than the average global sea level
j) The Netherlands is sinking as consequence of the post glacial rebound

6) What are in your view the two most important functions of rivers for the coastal areas? (2 points)

1)

2)

7) What is true? Production and respiration, metabolism in coastal systems: (2 points if all answers are correct)

a) Phytoplankton is the only important primary producer in coastal waters
b) In the Dutch coastal waters diatoms are the most important microscopic primary producers
c) In most estuaries Gross Primary Production (GPP) is much higher than Respiration (R)
d) Coastal upwelling is the only process that favor primary productivity in coastal systems

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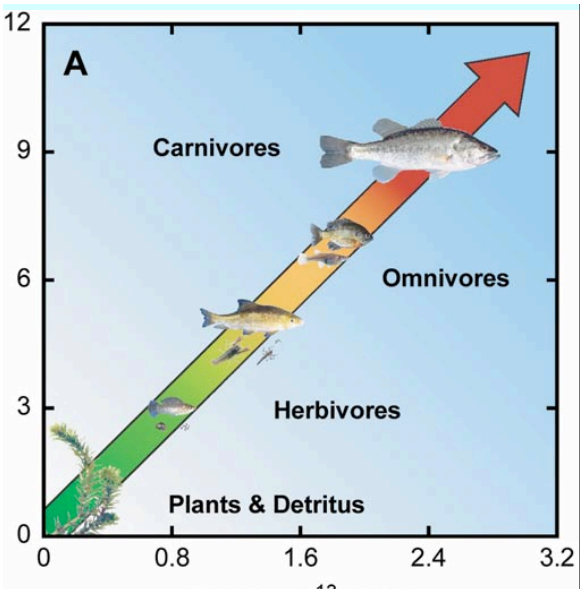
8) Complete these sentences and the figure (3 points)

Another important food source – next to primary productivity – which sustains estuary/coastal food webs is

Food webs can be studied by means of

What are the axes on this plot?



9) List three important functions of mangroves in tropical coastal ecosystems (1.5 points)

……

……

……..

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10) Disturbance: take an example of human-induced disturbance and 2-3 reasons why you think it can be called disturbance (1.5 pts)

Disturbance:

1)

2)

3)

11) What do we intend with the term *ecosystem services*? Give a short (one line) explanation and name two *services*? (3 points)

……

……

……

12) Explain this sentence briefly: species redundancy help stabilizing an ecosystem (3 points)

……

……

……

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Questions Sabine Gollner (excursion, beach organisms, sandy and muddy shores)

Per question 2 points. The points will be assigned only if the **whole answer is correct** (so you get all or no points per question). In some questions more than one answer must be given.

1. The intertidal zone is characterized by changing environmental conditions such as temperature or salinity change. In which sediment depth are these factors typically most variable?

A: in the upper-most centimeters
B: deep in the sediment
C: there is no difference in variability with depth

2. Sediments can be oxidized but also reduced. Where do we usually find a thicker oxidized layer?
A: at sandy shores
B: at mud flats
C: reduced and oxidized layer always have similar thickness

3. During the excursion day at Zandmotor we could not find a prominent reduced layer? Why?
A: Reduced sediment layers are only found near the Wadden Islands
B: sediments got oxidized by a recent storm and flooding that disturbed the sediment structure
C: spring tide had caused major flooding
D: neap tide had caused major flooding

4. Typical meiofauna taxa are
A: turbellarians
B: nematodes
C: echinoderms
D: crabs
E: bacteria
F: copepods

5. Typical morphological characters of a copepod include….
A: the amphid
B: segmented body (Prosome and Urosome)
C: one pair of antenna
D: the buccal cavity
E: the noto- and neuropods
F: the exo- and endopods

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Questions Stefan Schouten (organic matter)

1. Only a tiny percentage of organic matter in the ocean is buried in sediments. Why is this still important for the global carbon cycle? 4 points

a. It is the only long term sink for organic carbon and removes it from the ocean and atmosphere
b. It reduces the amount of nutrients for phytoplankton
c. Otherwise all the organic matter in the ocean would be respired
d. It leads to an increase in CO2 concentrations in the atmosphere

2. What does burial of organic matter in sediments over millions of years lead to in the atmosphere? 4 points

a. An increase in CO_2 concentrations
b. A decrease in N_2 concentrations
c. An increase in O_2 concentrations
d. An increase in CH_4 concentrations

3. How are oil and gas are formed from organic matter buried in sediments? 2 points

a. By microbes which eat the organic matter
b. By heat and pressure which crack the organic matter
c. By the sedimentary water which dissolves the organic matter
d. By the interaction of minerals with buried organic matter

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Questions Bas van de Schootbrugge (rocky coasts)

1. **Why are tides also called “the longest waves” on Earth? (3 pts)**

2. In which zones can rocky shores be divided? (3 pts)

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3. How would you recognise a paleo-cliff (rocky shore) based on the fossils you find? (4 pts)

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Questions Tjeerd Bouma (ecosystem services, ecosystem engineering)

1) **What is the advantage versus disadvantage of making stiff shoots over making flexible shoots?** (6 points)

2) **What is for a stiff plant species the difference between a single shoot and a vegetation patch, with respect to its interaction with the sedimentary environment?** (4 points)

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Questions João Trabucho (sediments)

1. Discuss the impact of the evolution of filter-feeding organisms on siliciclastic mud sedimentation in marginal-marine environments (10 pts).

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