Building with Nature & Beyond

Exercises: Chapter 1 to 4 Quiz Questions

Exercise Question Answers

This book is available in print and as an interactive e-Book. For full functionality we recommend using the free e-Book version. To use the interactive elements in the e-Book (i.e. excersises and assignments) you need Adobe Acrobat Reader, which is freely available for download for Windows and MacOS at https://get.adobe.com/uk/reader/.

The print version of the book does not contain answers to some of the quizzes. That's why for print book users or people who do not want/ have access to the interactive elements of the e-Book, the answers to these quizzes are made available in this document.

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1.3 Perspectives on Building with Nature - Video: BwN Specialist/Scientist

Question 1

The French coast of Brittany (image on the side) provides an example of the forces and interactions described by Dr. Ronald Waterman. From this image, select all the forces and interactions that apply.

- [x] Tidal action (ebb and flood)
- [x] Wave action and swell action
- [x] Sea currents and other tidal currents
- [ ] River outflow
- [x] Gravity
- [x] Wind
- [x] Rain
- [x] Solar radiation
- [x] Interactions in the water column and the substrate (e.g. marine organisms, silt, and salt)

1-1. The coast of Britanny, France. ⓪ 24219

Question 2

The coast of the Whitsundays (image on right), in Australia, provides an example of the forces and interactions described by Ronald Waterman. Select all the applying forces and interactions.

- [x] Tidal action (ebb and flood)
- [x] Wave action and swell action
- [x] Sea currents and other tidal currents
- [x] River outflow
- [x] Gravity
- [x] Wind
- [ ] Rain
- [x] Solar radiation
- [x] Interactions in the land-water marginal zone (e.g. dunes-vegetation or coastal zone-salt marsh)
- [x] Interactions in the water column and the substrate (e.g. marine organisms, silt, and salt)

1-2. Whitehaven Beach, Australia. ⓒ Wicker Paradise

1.3 Perspectives on Building with Nature - Video: BwN Engineer

Question 1

In the video, what does engineer Mark van Koningsveld mean with the phrase “let it grow”? Note: Make sure you select all of the correct options. There may be more than one!

- ☐ Stimulating economic growth
- ☑ Creating room for nature
- ☑ Aiming for sustainability
- ☐ Using natural forces to increase efficiency
- ☐ Not cutting vegetation down but letting it grow

Explanation

Although all answers are reasonable options, only “Creating room for nature” and “Aiming for sustainability” are explicitly mentioned by the speaker

Question 2

From an engineering perspective, who should be involved in the design of a Building with Nature infrastructure? Note: Make sure you select all of the correct options. There may be more than one!

- ☑ Multidisciplinary experts
- ☑ Problem owner/client
- ☑ Stakeholders
- ☐ Regional economic experts
- ☐ Environmental NGO’s

Explanation

Although the speaker only mentions the first three options explicitly, “Regional economic experts” and “Environmental NGO’s” can be, and usually are, stakeholders in the design of a Building with Nature infrastructure.A stakeholder is defined as an individual or institution with interest or influence in the project. Influence is understood as knowledge, financial resources, human resources, or any other factor that can influence the outcome of the project.

1.3 Perspectives on Building with Nature - Video: BwN Ecologist

Question 1

Dr. Bregje van Wesenbeeck, an ecologist, describes a flood defence system along the Indonesian coast. Which elements constitute this system? Note: Make sure you select all of the correct options. There may be more than one!

- ☐ Dunes
- ☑ Levees
- ☐ Breakwater
- ☑ Mangrove forest
- ☐ Groynes

Explanation

Although all options are reasonable components of a flood defence system, the speaker only explicitly mentions “Levees” and “Mangrove forest”.

Question 2

What are the primary goals of Building with Nature, from an ecological perspective? Note: Make sure you select all of the correct options. There may be more than one!

- ☐ Coastal defence
- ☐ Economic resilience
- ☑ Conservation
- ☐ Supporting livelihoods
- ☑ Restoration

Explanation

Although all options are reasonable goals, the speaker only explicitly mentions “Conservation” and “Restoration”.

2.2 Engineering Design Process - Video: Engineering Design Process

Question 1

From the options below, select the activities involved in the first Step 1, Problem Definition:

- [x] Definition of the project goal
- [ ] Definition of the functional requirements
- [x] Definition of the problem owner
- [ ] Definition of a preliminary design idea
- [x] Definition of the success criteria

Question 2

From the options below, select the major factors that influence the selection of a final design.

- [ ] Minimising costs
- [ ] Minimising environmental impact
- [x] Meeting functional requirements
- [ ] Integration of innovative construction methods
- [x] Meeting evaluation criteria

2.2 Engineering Design Process - Video: Designing Storm Surge Barriers

Question 1

Specialist Ad van der Toorn describes a typical engineering design process for one type of hydraulic infrastructure: a storm surge barrier. From the options below, select the principles that are mentioned or described in his answer.

- [x] Financial Feasibility
- [x] Reliability
- [ ] Environmental friendliness
- [x] Safety
- [ ] Connectivity of waterways

Question 2

In the following four questions, we ask you to type the word that best completes the following phrase.

“According to the speaker, when engineers design infrastructures, such as a storm surge barrier, they make choices at four levels. If the most general level is number one and the most specific level is number four,

The first level of choices is called:

Macro

The second level of choices is called:

System

The third level of choices is called:

Detail(s)

The fourth level of choices is called:

Element(s)

Question 3

In addition to the principles motivating the design of the storm surge barrier, which hydraulic boundary conditions and/or loads are taken into account?

- [x] Navigability of the waterway
- [x] River discharge
- [ ] Harbors’ functionality
- [x] Tidal dynamics
- [ ] Cost-benefit analysis

2.2 Engineering Design Process - Video: Designing Dikes

Question 1

According to the speaker, what aspects, other than hydraulic engineering, have to be taken into account while designing a dike?

- [x] Urban development
- [x] Financial feasibility
- [x] Spatial quality
- [x] Ecological aspects
- [ ] Public acceptance

Question 2

According to the speaker, the height of a dike is the basic design parameter. Other design parameters include:

- [x] Geometry
- [ ] Cost
- [x] Shape
- [ ] Location
- [x] Materials

Question 3

According to the speaker, the height of a dike typically correlates positively with:

- [ ] Risk of flood
- [x] Safety levels
- [ ] Investments in the infrastructure
- [x] Resistance to high water levels
- [ ] Public acceptance

Question 4

Failure mechanisms should always be considered, so that the design can be adjusted in such a way that this mechanism can be prevented. Which failure mechanism is mainly caused by wave impact?

- ( ) Piping
- (•) Erosion of outer slope
- ( ) Erosion of inner slope
- ( ) Macro instability

3.1 Introduction - Video: Oyster Reefs - An Inspiring Example

Question 1

In the previous video, Dr. Brenda Walles indicates that the oyster reefs increase in height over time. This is caused by the following process:

- ( ) Sediment deposition
- ( ) Ground subsidence
- ( ) Wave energy
- (•) Recruitment

Question 2

Oyster reefs are effective in reducing erosion of tidal flats. They do this by:

- ( ) Filtering water
- (•) Reducing wave energy
- ( ) Providing food for wading birds
- ( ) Preventing boats from accessing the tidal flats

3.2 Understanding Ecosystems - Video: Ecosystems: Abiotic Boundary Conditions

Question 1

Which of these variables are described as determining the type of ecosystem that can develop? (You may check more than one)

- [x] Temperature
- [x] Salinity
- [ ] Overfishing
- [ ] Size
- [x] Nutrient availability

3.2 Understanding Ecosystems - Video: Succession and Keystone Species

Question 1

Keystone species are crucial to ecosystem functioning. If you remove them the ecosystem may collapse. This term is drawn from an analogy in the field of:

- ○ Economics
- ◉ Architecture
- ○ Mining
- ○ Mathematics
- ○ Pharmaceutics

Question 2

The term pioneer species is mentioned in the video. Which of the following characteristics typify pioneer species? (You may check more than one)

- [x] First to colonise
- [x] Can tolerate harsh conditions
- [ ] Often are perennial plants such as herbs, or small woody plants
- [ ] Highly productive
- [ ] Comprise herbaceous forests

3.2 Understanding Ecosystems - Video: Biodiversity

Question 1

Biodiversity refers to ecological diversity across different spatial and temporal scales. In the video, biodiversity is linked to a number of ecosystem properties. Check the ecosystem properties that are linked to biodiversity.

- [x] Productivity
- [x] Stability
- [ ] Conservation
- [x] Resilience
- [ ] Food

3.2 Understanding Ecosystems - Video: Ecosystem Size and Connectivity

Question 1

You are designing a mangrove restoration project in Indonesia. A part of the natural mangrove forest was removed in the past. This has caused erosion of the coastline and has changed the sediment composition, wave exposure and submersion time at your study site. Now the environment is not suitable for pioneer mangrove species.

Purely from an ecological viewpoint, what is the best option for mangrove restoration? (Choose from the options in the next column)

- ○ Do nothing and wait for natural establishment of pioneer mangrove species, followed by natural mangrove development through succession
- ○ Actively plant different mangrove species at the eroded location
- ○ Create a suitable environment for pioneer mangrove species (by the use of brushwood fences, for instance) and actively plant different pioneer species in the improved environment
- ◉ Create a suitable environment for pioneer mangrove species (by the use of brushwood fences, for instance) and wait for natural establishment of pioneer mangrove species, followed by natural mangrove development through succession

4.2 Building with Nature Integrated Design Process - Video: Building with Nature Design Process

Question 1

From the options below, select those that represent the Building with Nature Design Approach.

- ☑ Considers Engineering Design Principles
- ☑ Considers Ecological Design Principles
- ☐ Integrates only the client's functional requirements
- ☑ Explicates trade-offs made in the design process
- ☑ Acknowledges complexity and uncertainty

Question 2

From the options below, select those that represent the Building with Nature Design Process.

- ☑ Life-cycle design approach
- ☐ The client alone defines the functional requirements
- ☑ Local residents are considered as a source of knowledge
- ☐ The problem is defined narrowly to build a concrete and better solution
- ☑ The design takes ecosystem character into account