

# TEACHER GUIDE TO E-BOOKS ON NATURE-BASED SOLUTIONS

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## INTRODUCTION

This teacher's guide provides information about the e-book 'Field e-books for eco and climate explorers' and its use in teaching. It also gives background information about Nature-based Solutions and offers additional material for inspiration.

The e-book is organized in an open, flexible manner that allows a range of different options for use – either as part of existing lessons plans or as an addition to a specific project. This allows you to adapt the e-book to specific classes and in relation to what nearby natural surroundings afford. To use the e-book, you may browse the options provided in the teacher's guide and select the ones you find most appropriate to your class, based on your personal teaching needs and preferences.

Because the e-books are both generic and open-ended, it is quite easy to use them in combination many different lessons – for example lessons on water, climate, insects, flora and fauna, biodiversity, etc. Because they are extremely flexible, they can be adapted to the specific needs and possibilities of each individual class.

**'Field e-books for eco and climate explorers'** is developed by educational researchers at the Danish School of Education, Aarhus University in Denmark for the interdisciplinary EU funded research project REGREEN.

**REGREEN** promotes urban livability, through fostering nature-based solutions in Europe and China using evidence-based tools and improved urban governance accelerating the transition towards equitable, green and healthy cities.

In our part of the project, we are concerned with teaching children about how we can construct our world for sustainable futures by focusing on nature, biodiversity and Nature-based solutions.

### **Nature-based solutions**

Is a form of urban planning that allows itself to be inspired by nature to solve climate challenges, such as the biodiversity crisis.

This is done by protecting ecosystems, building new ones and by re-establishing damaged ecosystems.

Se more : <https://www.regreen-project.eu/>

The objective of a field e-book is to stimulate children’s curiosity and engagement with local nature and nature-based solutions. Working on the book allows children to explore ways of greening urban areas to create healthier cities and mitigate risks of climate changes. Students learn about nature-based solutions in their local neighborhoods and can reflect on their learning processes.

The finished books can be uploaded to REGREEN’s homepage/digital educational platform as exemplars, or used on a school website to generate knowledge and more curiosity. They can also be used in combination with the [interactive walkable floor maps](#). The idea is for students e-books to inspire others within and beyond the school setting, including children/teachers in other countries.

Because the e-books can be published online, it is important to consider data protection. Do not use real names, pictures of faces, or audio voices in the books. Students can introduce themselves in the books through a group name, avatar faces, and by sharing their interests. You can use Book Creator’s speech to text program if you prefer that to writing in English.

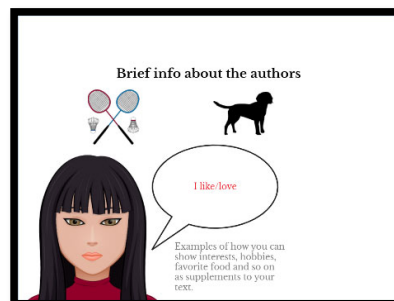
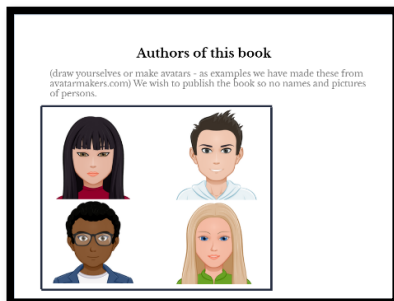
## STRUCTURE OF THE BOOK

Because finished e-books can be linked to a website, there must be a basic, yet anonymous author introduction. On the front page, students can introduce themselves by choosing a group name and mentioning the country in which they live. On one of the first pages, they can show where they live on a world map. If students wish, they can further add where they have previously lived or, if relevant, their parents’ country of origin.

To comply with GDPR regulations, it is important not to use real names. They can make up a group name, make avatars of themselves <https://avatarmaker.com/> and add a short list of interests and pictures of things (music, pets, sports, games) that characterize them.

We propose the following structure. It can be modified to better fit how you want to use the book.

### Introduction to the authors:



### Chapter one: Everyday places

- **General pictures of places you frequent:** classroom, schoolyard, playground, parks and other outdoor areas. Perhaps tell about how you use them.
- **Pictures of special or favourite outdoor places:** what makes them special? What do you do there and together with whom?

## Pictures of beautiful and ugly outdoor places: what makes them beautiful and/or ugly?

*Everyday places*

### Our school and school yard

Insert pictures you have taken yourselves in all following squares

Tell about the picture

Tell about the picture - write or use the audio to text functions

*Everyday places*

### Our classroom


Tell about the picture

Tell about the picture

*Everyday places*

### My favorite outdoor areas

What makes them special? What do you do there and together with whom?

## Chapter two: Everyday nature – the plants and animals we live with

- Pictures and names of local flora and fauna (near home or school, in neighbourhood)
  - 4 mammals
  - 4 insects
  - 4 birds
  - 4 flowering plants
  - 4 shrubs/bushes
  - 4 trees
- Audio clips of how to pronounce the names of these in your own language(s)
- Brief annotation (to share in English) – what ‘facts/feelings’ might be interesting to share
  - **Facts:** What the animals and insects eat, where they live, how they’re getting on,
  - **Feelings:** what you think/feel about them, your favourites/least favourites and why, the ones you’ve held/touched
- Nominations: Animals and insects (with pictures)
  - The ugliest/prettiest animal/insect
  - the animal/insect with the coolest superpower
  - the most helpful animal/insect
  - The weirdest/commonest animal/insect
  - The scariest/cuddliest animal or insect
- Nominations: plants, bushes, trees (with pictures)
  - The ugliest/prettiest plant/bush/tree
  - The weirdest/commonest plant/bush/tree
  - The most fun/scariest plant/bush/tree
- Make up your own categories (for example: Best camouflage, best colours, toughest, slimiest, fuzziest, scratchiest, prickliest, best smelling/stinkiest, and many more)

*Everyday nature*

### Species of birds in our neighbourhood

Name	Name	Name	Name
Facts and feelings about the bird	Facts and feelings about the bird	Facts and feelings about the bird	Facts and feelings about the bird

*Everyday nature*

### Which role does your chosen species play for the biodiversity in your area?


The flowering plants

The scrubs and bushes


The trees

*Everyday nature – the plants and animals we live with*

### Nominations of plants, bushes and trees

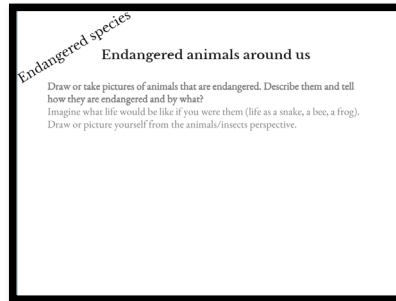
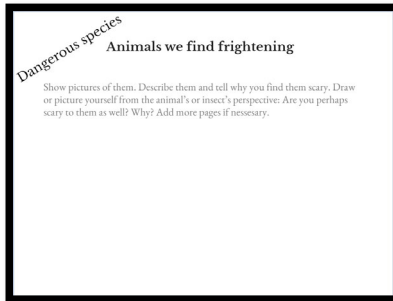


- \* Ugliest/prettiest
- \* Weirdest/commonest
- \* Most cool
- \* Most fun
- \* Scariest
- \* Make up more categories



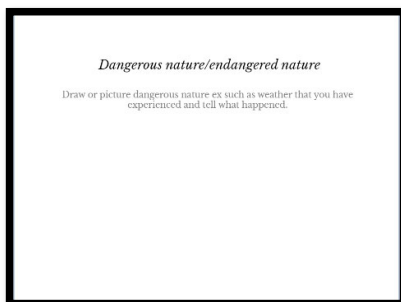
### Chapter three: Dangerous species/endangered species (animals, insects)

- Take of find pictures of animals/insects that you find frightening.
  - Describe them and tell why you find them scary. Draw or picture yourself from the animal's or insect's perspective: Are you perhaps scary to them as well? Why?
- Draw or take pictures of animals that are endangered. Describe them and tell how they are endangered and by what.
  - Imagine what life would be like if you were them (life as a snake, a bee, a frog). Draw or picture yourself from the animals/insects perspective.
  -



### Chapter four: Dangerous nature/endangered nature

- Dangerous weather: Draw or picture dangerous weather that you have experienced and what happened.
  - Why/how was it dangerous? To everyone or just to some? What was there too much of/too little of and how did this cause problems for humans, animals, plants
  - What do you think caused this dangerous weather?
- Dangerous environments/endangered environments
  - Is the environment you live in safe/healthy/ good for kids? Why or why not?
  - What is good about it – what is a problem?



### Chapter five: How might nature and humans give each other a hand? (Nature-based Solutions)

- Name three problems humans make for nature where you live. Illustrate if you want.
- Name three problems 'nature' makes for humans where you live. Illustrate if you want.
- Describe a way humans could work together to solves one of these problems.
- Describe a way nature (animals, plants, trees, water) might work together to solve one of these problems.

- Describe a way nature and humans could work together to solve one of these problems.

<p><i>How might nature and humans give each other a hand?</i></p> <p>Name three problems humans make for nature where you live:</p> <ol style="list-style-type: none"><li>1.</li><li>2.</li><li>3.</li></ol>	<p><b>Nature-based solutions in your city</b></p> <p>Find examples of NBS in your neighbourhood and take pictures of them</p> <p>What are they used for?</p>	<p><b>What is Nature-based solutions in your words?</b></p> <p>What is a nature-based solution?</p> <p>Do you know of any nature-based solutions where you live?</p> <p>What do they do?</p> <p>Who made them?</p>
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## Chapter six: If kids could decide ...

- What changes would you like to see? What could/should be different?
  - What should there be room for? What needs to be there?
    - Classrooms, schoolyard, playgrounds, courtyards, streets, neighbourhood, water areas etc.
- What could you do?
  - Things kids can do – alone or together
- How could you work together with others to change
  - Advice to the headmaster/school board
  - Advice to the neighbourhood
  - Advice to the mayor

The introduction and the first 4 chapters is constructed to encourage students to explore and investigate their nearby environment, to gather knowledge about their findings and show their

process in the book. As teachers, you can add presentations and exercises the relate to previous or upcoming lessons, as you wish. Chapter 5, however, requires a certain basic knowledge about NBS and therefor needs teacher presentations, perhaps video presentations and exercises in order to conceptualize, concretize and make clear how NBS is relevant to the students and their cities. (Please find resources for this at the end of this document)

## AN EXAMPLE OF HOW YOU COULD BEGIN THE COURSE/PROJECT

Different countries, cities and school systems afford different conditions – typography, vegetation types, living species, pedagogical styles and school organization that can impact how you use these field e-books. Of course, teachers will therefore adjust how they use the books to these circumstances.

However, the following is a description of how one could begin this course, just as an example that might inspire. We suggest that you might begin by introducing NBS and maybe show one or multiple of the videos explaining NBS (for example, using [Greenopolis](#)). Here, you can choose how you would like your students to work with this new knowledge,. They can discuss NBS in groups or do some online research by themselves and then explain the concept to each other. Afterwards, we recommend that you look at the different activities linked in the extra material of this teacher's guide to see if any of these might be beneficial to use in your class. This will help your students achieve even more knowledge about the topic before starting the work on the e-books. As already noted, you can always switch up the order we have proposed based on your syllabus, lesson plans and your class. What we have proposed is just a suggestion for inspiration.

## EXTRA MATERIAL

On the following pages we have collected material to help you get started. We begin with an explanation of the concept Nature-based Solutions (NBS), followed by a definition of the term. Further we have collected introduction videos both to help teachers gain knowledge of the subject and reflect on how best to work with some of the videos in class.

### Three definitions of Nature-based solutions (NBS)

On EU's Scientix website we find the following definition:

NBS are solutions inspired and supported by nature and ecosystems. As opposed to purely technological solutions, NBS are cost-effective, simultaneously provide environmental, social and economic benefits, and help build resilience to climate change. NBS bring more nature and biodiversity to cities, landscapes and seascapes, through locally adapted, systemic interventions. **Examples of NBS are green roofs and green walls to cool down cities in the summer, parks to combat pollution and provide leisure and exercise to citizens, green corridors connecting natural areas, urban food gardens, etc.** (<http://www.scientix.eu/pilots/nbs-project>).

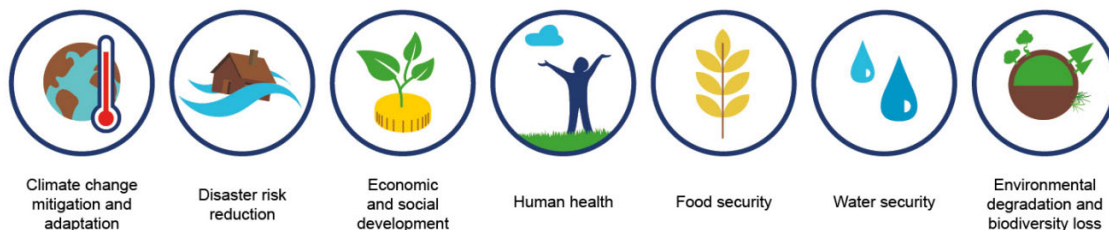
This definition by an urban ecologist working with NBS in Paris definition places particular emphasis on biodiversity:

NBS can consist in **protecting existing ecosystems, restoring damaged ecosystems or creating novel ecosystems**. NBS must provide multiple benefits for biodiversity and support the delivery of a range of ecosystem services. In fact, **biodiversity plays a central role in NBS, as it is the support of ecosystem functioning, stability and resilience**. The reach for biodiverse ecosystems (at the genetic, specific and ecological levels) should be a prerequisite regarding NBS design and management. The concept encompasses ecology principles, especially ecosystem ecology and ecological engineering etc. (Marc Barra, 2020).

The EU commission has defined NBS as :

Nature-based solutions are inspired by nature, use nature and/or are supported by nature. Specifically, **nature-based solutions have been defined as living solutions underpinned by natural processes and structures that are designed to address various environmental challenges** while simultaneously providing multiple benefits to economy, society and ecological systems (EU commission 2016).

According to the IUCN global standard, NBS can address the following:



(IUCN, 2020, p. 3 - [found here](#))

## What are Nature-based solution more specifically?

NBS are about halting biodiversity loss, protecting ecosystems and restoring damaged ecosystems e.g. in cities. One way to do this is by 'renaturing' cities – making room for less asphalt and more nature. At the same time, NBS is also about designing solutions that are holistic in the sense that they also take into account other objectives, such as climate protection and health, as well as social concerns.

### Renaturation and water

This is both about creating better conditions for biodiversity, but also about creating natural areas for drainage, where water can percolate during floods. It is both a Nature-Based Solution and what is called a LAR method (Local Drainage of Rainwater).

The idea is to create channels, ditches or rainwater harvesting beds where rainwater can be collected for a shorter period of time and slowly seep into the ground. They are sown with plants that can withstand both drought and standing water. This solves the problem of flooding, makes the city greener and more beautiful, and creates better habitats for insects, birds and other small animals. (<https://www.aarhus.dk/media/9355/lar-05-regnbede-03.pdf>). Lawns are also good for infiltration, especially when you make them with a hollow. It is possible, for example, to combine an overflow basin with a football pitch

Aarhus, a Danish city with particular challenges with flooding because of its many hills, has created small lakes, ponds, channels, and basins throughout the city. Besides keeping water from running too quickly downhill towards lower-lying parts of the city, these NBS are recreational, good for biodiversity and for children's play and learning about water and water species.

### Green walls and green roofs

Green roofs retain rainwater, increase the amount of urban green space, promote biodiversity, are nice to look at, and has a cooling effect on what is known as heat island (Zandersen, et al. 2014 Ecosystem based approaches to climate adaptation – Urban Prospects and Barriers). ([The benefits of a green roof \(in Danish\)](#))

More links to examples of urban NBS

- [Nature-based Solutions Initiative](#)
- [\(Social innovation living lab in Milan: Merezate](#)
- [Nature-based solutions for climate-resilient societies](#)
- Nature Based Solutions for Water: The United Nations World Water Development Report 2018 ([We Adapt](#))
- Mainstreaming nature-based solutions for sustainable and resilient cities ([Urbanize hub](#))

## Videos that explain NBS

We have searched the web for videos explaining NBS both for teachers and for the students. Here we have collected some we find useful. We recommend that you see some for your own understanding and in order to select which (if any) could be relevant for your class.

The years project (2019) "The Solution To Climate Change Is All Around Us" "We could get a third of the way to our climate change goals without any technology at all. All we need is to turn to the power of nature. Here are three natural strategies that could help us solve the climate crisis."

<https://www.youtube.com/watch?v=gSXOxrjCA40>



The nature based solutions initiative (2021) is behind “The future we can and must chose: nature-based solutions”. <https://www.youtube.com/watch?v=4-unUVfAwsQ&t=3s>

Nature now (Conservation.org) with Greta Thunberg There is a natural solution to the climate breakdown: protecting forests <https://www.conservation.org/video/nature-now-video-with-greta-thunberg>

A commercial but enlightening video from <https://www.susdrain.org> (2013) about where the rain goes in cities <https://www.youtube.com/watch?v=LMq6FYiF1mo&t=2s>

Why is biodiversity important? - with Sir David Attenborough | The Royal Society (2021) <https://www.youtube.com/embed/GlWNuzrqe7U?feature=oembed&modestbranding=1&rel=0&showinfo=0&autoplay=1>

Leaf of life films (2022) “How Arizonas Cities are Becoming a Sustainable Green Oasis in the Desert - GREENING THE DESERT” <https://www.youtube.com/watch?v=UHyrVKUEirY>

The Nature-based Solutions Initiative (2018) “Nature-based solutions to the hazards and impacts of climate change” is good at underlining the problems which NBS attempt to solve: <https://www.youtube.com/watch?v=paVTJtgGFFU>

The Rhone Mediterranean Corsica water Agency. (2016) “A new type of river management is coming!” A good video showing how renaturing rivers can prevent flooding: [https://www.youtube.com/watch?v=21YAP8RF\\_sw&feature=youtu.be&fbclid=IwAROV0my8dcBqNZogXDbcVQU7IIPe-EnvqULhhO5R-vSa5q4pB3rt\\_hygl5c&ab\\_channel=Sauvonsl%27eau](https://www.youtube.com/watch?v=21YAP8RF_sw&feature=youtu.be&fbclid=IwAROV0my8dcBqNZogXDbcVQU7IIPe-EnvqULhhO5R-vSa5q4pB3rt_hygl5c&ab_channel=Sauvonsl%27eau)

Sustainable drainage (2013) “Ever wondered where the rain goes? Sustainable drainage animation” [https://www.youtube.com/watch?v=LMq6FYiF1mo&ab\\_channel=susdrain](https://www.youtube.com/watch?v=LMq6FYiF1mo&ab_channel=susdrain)

The Environment Agency (2017) “Restoring the River Medlock” River restoration in Manchester: <https://www.youtube.com/watch?v=fqcjSxoSxRY>

[Youth and Environment Europe](https://www.youtube.com/watch?v=qV98CPvAOP0&ab_channel=YEEuropeYEE) (2020) Climate Change and Nature-Based Solutions [https://www.youtube.com/watch?v=qV98CPvAOP0&ab\\_channel=YEEuropeYEE](https://www.youtube.com/watch?v=qV98CPvAOP0&ab_channel=YEEuropeYEE)

## Ideas for experiments and exercises

We find it useful if you can support the work with the field books with hands on experiments and exercises. We have searched and found some and urge you to come up with relevant experiments for your class and share them with us – of course we credit you for your work.

- **Bioblitz.** See e.g. <https://education.nationalgeographic.org/resource/bioblitz> You can use identifier apps if you bring phones or tablets. The app SEEK by iNaturalist is suitable for this and national bird-, plant-, gather-, fungi-, e.g. identifier apps
- **Exploring ecosystem services and nature-based solutions to urban problems.** Age: 12-18. <http://www.scientix.eu/resources/details?resourceId=28160> (click on the preferred language). Project developer: Scientix. Author Pernilla Berglund.
- **Greta – Green relevant environment to all (understanding NBS).** Age range: 13 – 14. <http://www.scientix.eu/resources/details?resourceId=28168> (click on the preferred language). Project developers: Scientix. Author: Gabriela Krizovska.
- **Water management at urban areas.** Age range: 12 – 13 <http://www.scientix.eu/resources/details?resourceId=28157> (click on the preferred language). Project developers: Scientix. Author: Jose Vinas
- You can check if **Scientix** has published new material here <http://www.scientix.eu/projects/steam-partnerships/nbs>



## REGREEN educational resources

### [Greenopolis](#)



### [Interactive Walkable Floormaps](#)



Photo: Sally Anderson

### [Play biotopes](#)

## Movium Facts #3 2022



PLAYGROUNDS - PLACES WHERE  
BOTH CHILDREN AND NATURE  
THRIVE

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