



Sheet 4 :

The benefits of biodiversity

A) DESCRIPTION OF THE ANIMATION

The aim of this animation is to illustrate the vital role assumed by biodiversity in maintaining an ecological balance, both for the planet and for human beings. Indeed, biodiversity plays an important part in determining the way ecosystems function. Biodiversity helps the Earth in many different ways, including the purification and storage of freshwater, soil retention, plant pollination and the absorption of excess CO₂ generated by human activities to name a few. In this regard, preserving biodiversity also works in favour of human beings, who benefit from these 'free' services provided by nature.



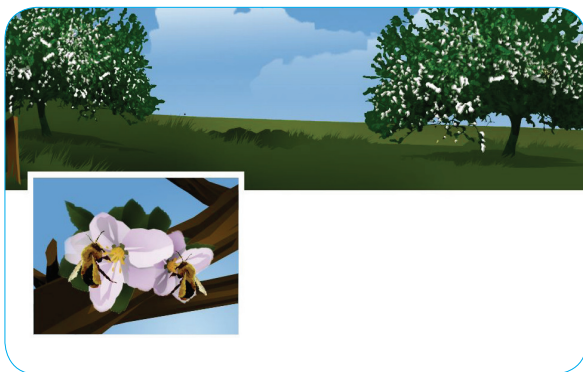
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B/ LET'S TAKE A CLOSER LOOK...

1/ POLLINATION: A FREE SERVICE ... BUT FOR HOW LONG?

Pollination is essential for the reproduction of numerous plant species. Quantitatively speaking, more than 80% of the world's plants and 84% of the species cultivated¹ in Europe are directly dependent on pollination by insects. Researchers from France's INRA² have developed a methodology showing that 70% of onion seeds are produced through bee pollina-



tion. In fact, when we take a closer look at things, it's hard to imagine a single meal that bees have not had a hand in with their pollinating activities! The Hindu Kush (to the west of the Himalayas) is a mountainous region extending from China to Afghanistan that abounds in apple trees. In the past, these fruit trees were a significant source of revenue for many farming families: annual production was once estimated at over 2.5 million tons, generating earnings of 450 million dollars.

But over the past ten years, apple production has fallen by 50%. This decline is a result of the vulnerable local bee population wiped out, due to the

destruction of its natural habitat and to its exposure to pesticides and climate change.

In China and Nepal, women and children have had



to resort to manual pollination, blossom by blossom, to make up for the lack of bees. These new pollinators are now restoring production to its initial level, but at what price? One thing is certain: it is a very labour-intensive and costly process, given that it takes twenty people to replace two beehives and to pollinate 100 apple trees, blossom by blossom³

In India's Himachal Pradesh region, people have adopted a more sustainable strategy that consists in restricting the use of pesticides and introducing the previously unknown practice of bee-keeping. Colonies of bees have been introduced in the area, of two specific types: the domestic honey bee (*Apis mellifera*) and the Asiatic honey bee (*Apis cerana*⁴). The result is that the apple trees are healthier and the farmers have something to smile about again. In total, about 100,000 species of insects, birds and mammals play a part in the sexual reproduction of most of the world's flowering plants – including over two-thirds of cultivated plants – that reproduce through pollination. Unfortunately, populations of pollinators are declining throughout the world and many species have become endangered. Out of all

¹ Such as rosaceous fruit trees (apricot, almond, cherry, strawberry, peach, pear, apple, plum), cucurbits (courgette, melon, watermelon), solanaceous plants (tomato, pepper), kiwi, oil-producing crops (colza, sunflower) and many vegetables and condiments (artichoke, cabbage, fennel, onion, parsley, leek, escarole and curly endive) and fodder crops cultures (lucerne, clover) for their seed.

² Institut National de la Recherche Agronomique français: http://www.inra.fr/presse/biodiversite_des_pollinisateurs_et_agriculture

³ <http://www.enseignementsuprecherche.gouv.fr/biodiv2005paris/dpbiodiversite.pdf>

⁴ <http://www.ecologie.gouv.fr/L-abeille-et-le-pommier.html>

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the pollinating mammals and birds, at least 45 types of bats, 36 species of non-flying mammals, 26 types of hummingbirds and 70 species of passerine birds are thought to be under threat or extinct.

On the upside, the benefits of biodiversity on human activity, and in particular on farming, are beginning to gain recognition and can even be quantified in economic terms.

As a result, the overall contribution of bees to GDP in the US was estimated at 1.5 billion dollars in 2000... While it is hard to place a value on the extent to which food production depends on the services of pollination by animals, it is thought that the annual monetary value of these pollination 'services' in world farming could be as high as 200 billion dollars⁵ !

2/ PREVENTING FLOODS

The most common natural disasters in Europe are floods. Unfortunately, one of the effects of climate change is an increased amount of rainfall. In Belgium, for example, an increase of 6 to 23% in winter rainfall is expected between now and 2100. The risk of flooding is further exacerbated by a series of landscape characteristics: the disappearance of hedges and woodlands, an increase in the practice of growing large areas of single crops, the adjustments made to river beds, the practice of sending watercourses through pipes or into canals (which, of course, are man-made), the increase in built-up areas that intensify water run-off – and so on.

To cut down on the risk of flooding and the high costs associated with it, it would be preferable if we worked "with" nature rather than "against" it. How? By preserving or recreating wetlands that help control floods thanks to their ability to retain water. These wet zones act like sponges and they release their excess water gradually. Preserving meadowlands and wooded areas also enables the flow of water to be regulated naturally. These natural meth-

ods are a great deal less expensive than building artificial barriers and embankments!



One university centre conducting socio-economic research on the environment (CSERGE) estimated the **economic value of freshwater wetlands at almost 70,000 € per hectare per year in 2005**, the greatest benefits being associated with the protection against floods and the environment's ability to purify itself. A report produced by WWF in 2004⁶, based on the analysis of 89 evaluation studies, estimated the economic value of the world's wetlands at 70 billion dollars a year. The report also highlighted the fact that a high value was attributed to the natural water regulation and filtration role, as well as to the pleasures of enjoying nature and indulging in recreational fishing.

⁵ http://www.futura-sciences.com/fr/sinformer/actualites/news/t/vie-1/d/proteger-les-pollinisateurs-et-les-services-gratuits-de-la-nature_8073/

⁶ The report can be downloaded in pdf format from: <http://assets.panda.org/downloads/wetlandsbrochurefinal.pdf>

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C) GROUP ACTIVITY TO BE CARRIED OUT IN CLASS

PERMEABLE OR NOT?

Aims

Conduct an experiment to identify the elements that hinder or help the flow of water (permeable and impermeable materials)

Highlight the importance of land use for draining water away when there are heavy rainfalls

Equipment

Watering cans filled with water (one for each group)

Photocopies of the double-entry table

Map of the area where the school is located

Timing: 45 minutes in total

PROCESS

Preparation: 5 minutes

Divide the class into small groups (into groups of 3, for example)

Step 1

Group walk – 20 minutes (depending on the route taken)

- Using the watering cans, sprinkle water on different types of soils. By observing what happens to the water, the children should be able to determine whether the ground is permeable or impermeable. Fill in the double-entry table below (adapt the table to suit the surroundings of the school and the route taken by the group walk):

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- Using a map of the district where the school is located, the children can make a list of the impermeable and permeable areas locally, colouring the impermeable areas in red and the permeable areas in green

	Fairly permeable	Fairly impermeable	Observations
Concrete			
Cobbles			
Tarmac or asphalt			
Sand			
Gravel			
Packed earth or grass			
Freshly-dug earth			
Plastic			
Other.....			

Step 2 :

20 minutes of answering questions

- Back in the classroom, the children should try to answer the following questions in order to establish the connection between urban development and the risk of flooding:
 1. Which is the predominant colour: red or green? What does that mean?
 2. If it starts to rain heavily, which surfaces are best suited to avoid a flood? Why?
 3. When the water is not absorbed by the ground, it runs off and drains away somewhere else. What facilities are there to enable the water to drain away? Where does it go to?
 4. How does a flood happen?
 5. What facilities could be installed to better protect the school against the risk of flooding in the event of heavy rainfalls?

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D) RESOURCES/ REFERENCES

The climate is us, WWF Belgium, 2008.

This file can be downloaded in pdf format from:

http://www.wwf.be/_media/BookWWFProf_fr_889149.pdf

For more detailed information about the importance of capturing and purifying water, download the documents in pdf format from:

http://www.ramsar.org/info/values_floodcontrol_f.pdf

and

http://www.ramsar.org/info/values_waterpurification_f.pdf

Junior dossier about ponds, WWF Belgium. This dossier can be viewed at the WWF Belgium junior website, along with numerous information sheets about flora and fauna. Also available are observation exercises and accounts of the programmes undertaken by WWF to preserve biodiversity all over the world:

<http://www.wwf.be/fr/juniors/doc/mets-ton-nez-dehors/mares/mares.htm>.

Any youngster under the age of 13 can join the Cyberpanda Club free of charge, without being a member of WWF. When they sign up, they receive a club cyber-card and a totem. An electronic letter is sent out each month telling them what's happening on the website.

Also see the database of teaching tools provided by the IDée Network (Information and Distribution of education on the environment) :

<http://www.reseau-idee.be/outils-pedagogiques/>

