

# Balbuzard and the keys of knowledge

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## Dear Colleagues, Dear Parents

Through this story, children will discover that the current warming of the climate is unusual and closely linked to the industrial revolution which began in the late 18th century and that man is responsible for this change in the climate.

They will also recognize three major consequences of global warming for people around the world and the urgent need to change lifestyles.

They will learn how the ice analyzed by geologist is a memory of the climate while air bubbles trapped in the ice are memories of the composition of the atmosphere.

Finally, they will be surprised by how these bubbles have been discovered.

## Teaching suggestions

This story could be related:

- to history lessons about discoveries and inventions of the industrial revolution (eg. The first steam engine, the first rail, etc ...). "Osprey and the keys of knowledge" will help look at the positive and negative consequences of the industrial revolution on current climate changes and stimulate the children's imagination to envision a better future for the planet;
  - the study of snow and glaciers would encourage the children to learn about ; their formation, their fragility and their usefulness in certain parts of the world (the Himalayas). "Balbuzard and the keys of knowledge" will help children learn more about what glaciologist and research scientists do to help us envision a better future for the planet;
  - to lessons about natural disaster such as floods;
  - to lessons in geography with respect to the deserts both of sand and ice;
- but also
- lessons in civic responsibility and even friendship.

It is important however that each activity ends with the commitment of the child to persuing an easy means to protect the planet. He must understand he has his share of responsibility and that all actions of individuals will safeguard the planet.

### Learn more about the characters:

- **Claude** is the name of Professor Lorius, French glaciologist and climatologist. In 1957 he spent an entire winter, with 2 companions in Antarctica, isolated in the French base Charcot (hut buried in snow). Then, between 1960 and 1980 he participated in more than 20 polar expeditions and discovered the mountain chain that crosses Antarctica. A mountain bears his name: "Mount Lorius" During a winter in Adélie Land (Antarctica) in 1965, he made an important discovery: while drinking whiskey in which he put an ice cube from a drill, he observed that ice released air bubbles and decided to analyze them. Research based on this discovery has since provided the essential keys for understanding the evolution of climate on Earth. For all research and scientific discoveries throughout his career, Claude Lorius received numerous awards worldwide including "The Blue Planet" in 2008. Claude Lorius also attaches great importance to education to influence human activities and their impact on the environment.
- **The "Osprey"** is a medium sized eagle (between 55 and 69 cm) also called a "fish eagle" because he eats only fish. He lives for thirty years. His back is dark brown, almost black and he has a white chest. He has very strong hands with long claws. Its characteristic: his outer toe is reversible, which facilitates the capture of its prey.

## What I learned:

**Anthropocene** is the word used by some scientists to describe the new period of the Earth's history that began in the late 18th century with the industrial revolution. This word means "era of the human", because since the beginning of this period the excessive way individuals use fossil resources - coal, oil and gas - has impacted the environment and has altered the natural balance of climate.

**An ice core** is a story.

The act of extracting the sample of ice called "ice sample coring" - the shape of a cylinder (which using a little imagination looks like large carrot) collected by drilling deep into the ice cap. Scientists analyze ice cores, because the ice is a memory of the climate and air bubbles that are trapped are memories of the composition of the atmosphere.

## Suggested activities:

- Tell the story;
- Discuss with the children to help them discover what causes global warming and help them find the things they can do themselves to reduce greenhouse gas emissions;
- Produce ice crystals by folding and cutting using:  
[http://www.contespedagogiques.be/cristal\\_de\\_glace\\_pg1\\_angl.html](http://www.contespedagogiques.be/cristal_de_glace_pg1_angl.html)
- Explain that each ice crystal is a promise that we are making to do something to help our environment.

Each child who wants then pastes one or more crystals on a blue panel (representing the sea).

Together, we make change. Paste a seal to decorate the panel:

[http://www.contespedagogiques.be/dessin\\_disque\\_phoque\\_1.html](http://www.contespedagogiques.be/dessin_disque_phoque_1.html)



For three days, the young Osprey was very lost. He did not eat anything barely surviving. His parents decided that it was just as well.

Balbuzard was so proud to be a fishing eagle that instead of listening to his parent's fishing lessons, he spent most of the time daydreaming about his future great adventures.

Now, it was too late! Balbuzard remembered however, that to fish, he needed to use his reversible outer toes which turn over to tighten onto the fish. He then can fly away with the head of its victim pointed into the wind.

Famished, all alone, he flew over an immense stretch of water in search of prey.

Suddenly, courageously he plunged legs first, clutched an enormous fish, forgot to close his nostrils and... started to sink.

A burst of energy propelled him to the surface, but lacking experience, he did not know how to loosen his talons (fingers on raptors) and he was not able to fly away. The fish was too heavy.

Balbuzard was drowning...



Terrified, he screamed, and the waves carry the sound far.

- Tcherik, tcherik !

Claude, a scientist of the ices who, in the light of a beautiful red lantern, studied graphs on the bridge of a very close boat, heard Balbuzard's cries of distress.

Quick as a flash, Claude moved towards the scoop with the long handle which stood on the bridge and with much skill scooped Balbuzard out of the water.

– How greedy thought Claude, seeing the enormous fish still stuck on the legs of the Osprey. He should have released it !

Then realizing that the bird was an inexperienced young person, he placed it in the shelter out of the wind leaving him to recover and eat his first fishing.

The following days, Balbuzard was so too afraid to leave his shelter. He needed much patience and encouragement from Claude to fish again.



Osprey would have liked to remain with his savior, but the boat sailed towards very cold areas where an Osprey cannot survive.

So, he flew away sadly after he deposited his most beautiful feather close to the gleaming lantern where he was accustomed to working.

- What an incompetent ! Launched a bird flying high in the sky.
- What a shame ! says another.
- Oh ! The timorous one ! said a third while spitting on him.

And the birds made fun of him in the same way...

Ashamed, Balbuzard found a hiding-place where he cried, but the wind which hears everything transported the gossip far away, to the top of the mountain where the Large Golden eagle, his cousin lived. He knew the thoughts of everyone.

- This Osprey has big dreams. I like this small one! I will help him, said the Large Golden eagle while leaving.



His majestic flight carried him right to the hiding-place of Balbuzard to the amazement of all he said these sentences:

- Little One, if you really want it, you will find within you the force to fly at all times, in all winds, on the ground and sea. Chase your dreams without listening to the kill-joys!

Intrigued, Balbuzard did not dare to say anything.

The Large Golden eagle then prepared a mixture made of special grasses. With the last feather of his wing, he painted the head of Osprey.

At once Balbuzard sank into a deep sleep.

With he woke up, he understood the language of men and was very happy.



At the same time, Claude and his two travelling companions arrived in Iceland. A tiny isolated hut, buried in the snow, would be their house and their laboratory in this white desert where the sun was going to disappear for six winter months.

Nobody would ever have found Claude if a young disobedient Snowbird had not dared to venture where no animal had never been and had seen him.

The wind, this large chatterer, quickly spread the news and Balbuzard got under way.

- What a voyage! The winds carry me where I do not want to go, the fish find are fatty and do not taste good! I do not have a place to sleep, and there is only water, groaned Balbuzard after a long exhausting flight.

But finally, shivering with cold, he arrived in Iceland and discovered the boat with the red lantern.

Without a sound, he sheltered and waited long months for the return of the sun and Claude.



Their meeting was cordial. Claude brought an enormous fish for the long trip and he served glasses of whiskey to the crew to celebrate the event. In his glass, he added three ice cubes cut from a long icicle which grew close to his hut.

Raising his glass, he said:

- To your heal...

but he stopped suddenly. The pieces of ice exploded in his glass. Many bubbles of air left the ice and made his whisky semi-sparkling.

The moment was magic. Claude had just made an enormous scientific discovery! The ice locked up bubbles of air under pressure. Claude understood that by analyzing them he could discover many things.



He repeated the experiment several times then said:

- We have just discovered one of the keys that open the doors of knowledge. Now, we will search to find the others! On the way, we will return to the country!
- Problem! Problem! What keys? asked Balbuzard who had stuck his beak in each glass to taste this odd liquid and was now a little drunk.

During the following days, the mood on the boat became very serious. Oddly, Claude did not seek the keys. On the contrary, he spent long hours behind a microscope or on the telephone with climatologists from lots of countries.

To help his very occupied friend, Balbuzard searched the boat roofs, but could not find a key, he returned to his shelter to think:

- With my piercing sight, I must find these famous keys of knowledge!

And he flew away quietly.



- A key does not float on water! I must move towards the land, says Balbuzard to himself.

But, despite all his efforts after several days of research, there was still not a key on the horizon.

Tired and discouraged, overpowered by heat, Balbuzard decided to be still.

- Oh! Sand is scorching my feet! Where am I? he squealed in a high voice.
- You are in the desert a long animal without leg tells him while crawling in a zig zag. Here, nothing grows, there is no water and the weather is very hot. If you are thirsty, follow the Dromedaries, they will lead you to the country of men.

Balbuzard was filled with so much wonder at the beauty of the landscape that he almost forgot his mission, but he was thirsty and so he took the advice of the snake.

A miracle ! At the entry of the village, half hidden in sand was a large key. Balbuzard grabbed it with excitement and took refuge in the only palm tree to enjoy his discovery and to rest.



Under this tree, the elders of the village were meeting. Balbuzard overheard their conversation:

- The desert is still advancing, said one of them. Soon sand will cover the village and it will drive out us. Already it is having fun burying certain objects.
- It is because there has not been rain for a long time! The climate is heated. Soon, we will not be able to live here any more! said another.

Balbuzard thinks that all of this is catastrophic and that Claude who often talks to climatologists would be interested to hear this. He stored these words in his head and started on his way in the direction of the sea to fish, because he was hungry.



Suddenly, as he approached the coasts, a strong wind started to howl. In the distance, Balbuzard saw a swirl going up towards the sky. He did not have time to find shelter and was carried upwards.

- To fight is impossible, he groaned. There is only one solution: to open my wings and to go where the wind carries me...

Thus Balbuzard arrived in a country whose name he did not know.

- What a funny country! Everything is underwater. Only the roofs of the houses are uncovered. The residents surely drive submarines, he thought.
- But no! This country is splendid especially when the sun sets, answered a beautiful parrot. The inhabitants had to flee. It is because of the climate which is heated. Water takes more space when it becomes hotter. It entered my country, invaded it and demolished it. It is quite sad!

Seeing such a spectacle of desolation, Balbuzard decided not to delay. In passing, he caught a key that a water torrent carried and that made him think: two keys - two disasters. Was this normal?



Not knowing where to go then, Balbuzard flew up high and found a rather strong wind. He let himself be taken along spreading wings and closing his eyes.

What a delight for an eagle dreamer!

- Help !! I cannot breathe any more! he shouted suddenly.

Opening his eyes, he discovered the tops of superb snow-covered mountains and panicked.

- Do not be afraid, there is less oxygen here. Breathe more slowly, a familiar voice tells him. It is nice of you to visit me.

Next to Balbuzard sits the Large Golden eagle, his cousin. Both were sitting where the sight was splendid.

- What a shame, says the Large Golden eagle. You see that glacier over there, that large river of ice? It melts a little more each year. Soon it will disappear. People of this valley who drink this water will have to leave so as not to die of thirst. All because of the climate which is warming.
- Always the climate! What is happening? Said a suddenly distressed Balbuzard.
- Take this key, said the Large Golden eagle which had foresaw the visit of Balbuzard and fly in the direction of the sun, you will find Claude. Help him to find the answer.

Right before his departure from protected sound, the Large Golden eagle painted his head again with his special mixture while saying:

- You will have the ability to speak the language of men and to open the doors of the knowledge to them!



With pride, firmly holding his three keys, Balbuzard took leave so quickly that he could not slow down and was engulfed in a large black cloudbank caused by the high chimneys of the many factories that he flew over.

He coughed, sneezed, couldn't breathe... but courageously carried on passing above big cities surrounded by a thick cloud of pollution.

- My beautiful white feathers are gray with dust and the keys are heavy, groaned an exhausted Balbuzard.

But feeling the sea close by, he suddenly accelerated and finally reached the ocean in the dark of night.

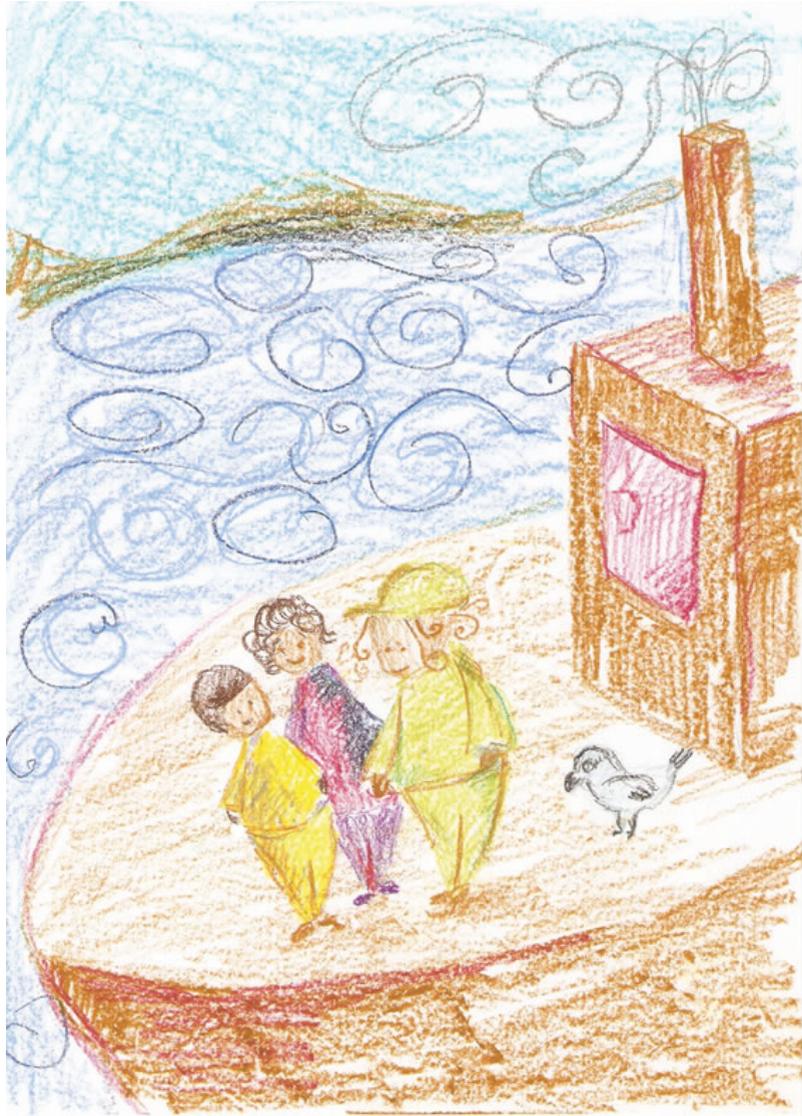


- Yuck! It stinks here! Balbuzard says to himself. It made him feel as though he might vomit. Soaking my legs in the water will refresh me. I am too tired.

But as soon as his legs touched the water, a viscous layer of sticking oil stuck to his leg along with a key.

Seeing, in the distance, the warning signal from a gigantic tanker, he understood it was an oil slick, terror to animals, that invaded the ocean and he shed a tear thinking of all the good fish which were going to die deprived of oxygen and food...

The black night made locating his friends difficult. He continued on his way, giving many cries of warning. And when he finally found the boat with the red lantern, he took refuge there.



It was early evening when Balbuzard finally opened his eyes.  
On the bridge, everyone was talking with excitement.

- That is it! The bubbles of air revealed their secrets! Since the beginning of time, they trapped all of the gases in the atmosphere. One of the trapped gases is carbon, you know, the one used to make fizzy drinks also known as CO<sub>2</sub>. Thanks to the bubbles of air, my team could make a table showing the quantity of this gas present in the atmosphere for almost a million years. Don't you find this sensational? Balbuzard heard.
- Yes, but do not forget that the bubbles of air are a memory of the atmosphere; the ice is a true memory of the climate! While analyzing it, my team managed to discover how the temperature changed over a million years. We also constructed a table someone else said proudly.

Claude looked with admiration at these two tables, but suddenly he frowned.

- But... but... but... it is very worrisome! Look! The figures show that since the year 1800 there is too much carbon gas in the bubbles of air and also in the atmosphere and that at the same time the climate is warming. What happened? What could have changed in the world? Claude asked with anxiety.



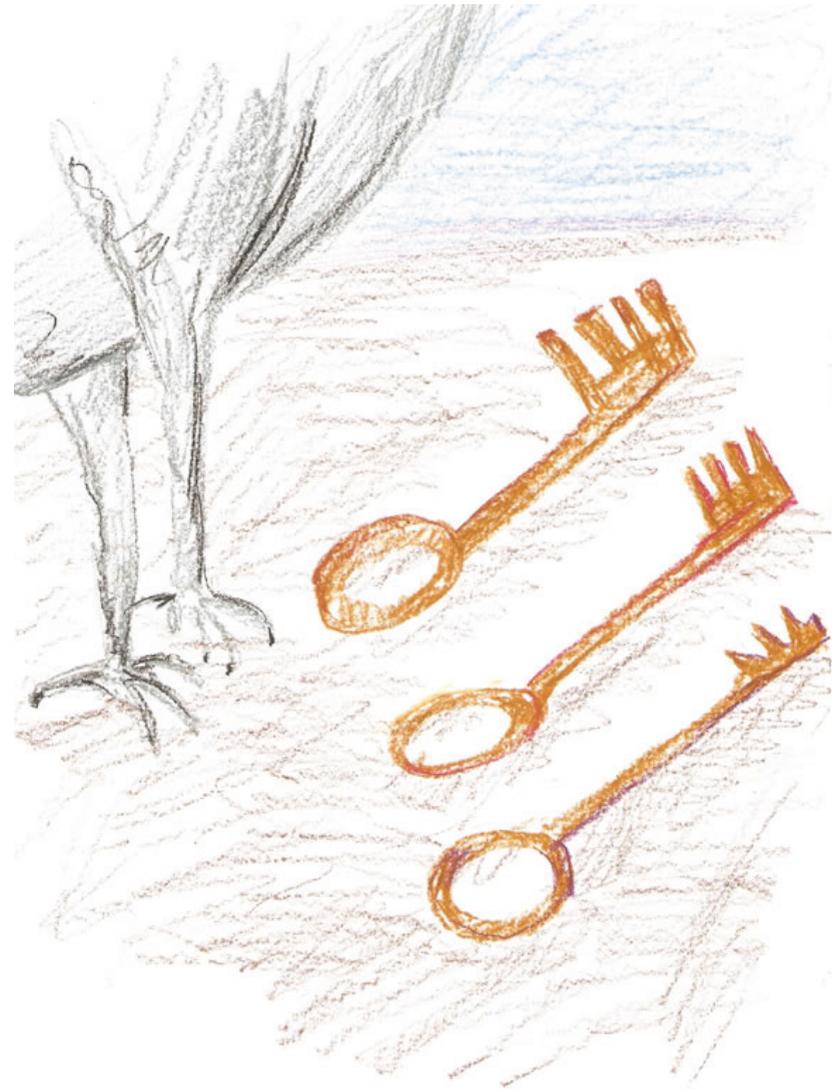
Believing that his keys would bring the solution, Balbuzard left his shelter and stood in the middle of the group reciting the passage he memorized and placing his black oily keys on the table.

– Where does this bird come from? And why does he have his oily legs on our graphs?

Claude recognized him.

- Come Balbuzard, a good cleaning will make you better received, he said, taking Balbuzard to the kitchen to welcome him with a large fish.

Balbuzard did not appreciate his bath at all! Claude rubbed his feathers with a brush with teeth and put the dust from his feathers in a small pot which he placed close to his microscope.



But Claude seemed elsewhere. So, Balbuzard waited patiently for the moment when he could draw his friend's attention to his keys of knowledge.

This time, concentrating, because it was the first time that he spoke the language of men, he delicately deposited the three keys at the feet of Claude and said:

- 1. desert advances - population to leave - climate too hot
- 2. sea level rises - population to flee - climate too hot
- 3. glacier melts - population thirsty - climate too hot

Claude was amazed. Thanks to Balbuzard, he came understand that the warming of the climate had serious consequences everywhere in the world. Yes, now he knew!



During the following days on the boat, everyone tried to understand why the carbonic gas normally present in the atmosphere had increased so much.

Balbuzzard really listened and found that very boring.

- This research is exhausting. A pause is essential! Claude said rising.
- Finally! Balbuzzard shouted.

And without paying attention, he flew toward his friend to propose a fishing party to him...

But,! Bang! ...

His large wings tumbles, pencils, measuring instruments and also the pot containing the dust collected on his feathers. The pot broke and was emptied on the two very important tables.

Feeling very awkward, Balbuzzard lowered his head, but Claude did not move. His silence was odd. He had become like a statue staring at the two covered tables of dust.

- What is there? Do you see anything? he asked his friends who ran to see what the commotion was all about.

During several long minutes, Claude did not answer. Then suddenly, he shouted:

- Balbuzzard found it! It is Balbuzzard who solved it! Quickly a whisky with polar ice cubes for everyone!

Balbuzzard did not know what he had found. In fact, he felt relieved and was encouraged by the sudden good mood of all.



When the ice cubes exploded in the glasses, Claude explained:

- The dust that Balbuzard brought back on his feathers is the result of the pollution which the men make while burning coal and oil.
- So? His companions said in unison.
- Eh well, when these raw materials are burned, in addition to dust, they also create CO<sub>2</sub> in the atmosphere. This is how CO<sub>2</sub> is manufactured in excess in the atmosphere! It comes from pollution!
- But, it is true! Somebody said. Listen to your history lessons! About the year 1800 industry started to develop. To make the machines work, men burned a lot of coal, and alot of oil and gas. And since then it has only been increasing!
- Then, we are all responsible for what arrives, says a distressed Claude.
- I drank polluted whisky! He said which made a few people feel nauseas.
- But there is no factory in the deser,t nor in the glaciers, pointed out Balbuzard who spoke well now.
- See, Claude says to him by attaching a key to his leg to help him understand the importance of this last discovery, you must know that the ground shares one atmosphere and that the ocean and pollution does not have a border.

Balbuzard was so proud of his jewel that he flew away into the rays of the sun which would make his own key of knowledge shine.



Later, when he returned, Claude was waiting for him on the bridge with a case containing a paper roll in his hand.

- Tomorrow, Claude says to him, a very important world meeting is being held very far from here. Only you can arrive in time to alert the world. Will you be the messenger of our catastrophic discovery? Save the planet, Balbuzard! Awake the world!

Balbuzard who also had to be saved understood the urgency.

The wind which hears everything blew this information at a tremendous speed. It blew with so much enthusiasm it broke the windows of the building where the meeting was taking place and projected Balbuzard into the middle of the assembly.

- Listen! I am really very awkward. You will find a package attached to my legs! Balbuzard said while trying to land.

He shook his leg vigorously, making the package fall and catching the wig of an attendee inadvertently. He heard the laughter of the assembly and left without being seen.

Then, not being sure that he achieved his mission, he hid and listened.

- Oh! Ah! This is alarming, he heard in all the languages.

Flabbergasted by the message, the important leaders of this world contacted Claude.

And, today, everywhere on the earth we proclaim that it is urgent to stop pollution and that every small decision made here has repercussions that will be felt on the other end of the world, because the air does not have a border.



Returning on the boat to Iceland, Claude was thoughtful. Looking at Balbuzard he asked:

- Do you believe that everyone knows that we hold in our hands the future of the planet?
- All those which have keys must know, answered Balbuzard .

And he turned his to shine in the sun.

Claude smiled while thinking of all the keys which exist everywhere in the world.

**“We don’t inherit our parent’s earth, we borrow it from our children”**

Kenyan proverb

Dedicated to my big brother from the polar countries and to Simon who was just born...

For their verification of the scientific fact, but mainly for always being there, from the bottom of my heart:

**“MANY THANKS”**

- to Claude Lorius, glaciologist, CNRS Gold Medal, Member of the Academy of Sciences ;
- to Gauthier Chapelle, doctor of biology, Secretary General of the AISBL Biomimicry Europa ;
- to the International Polar Foundation

D/2009 M.Dielemans, **editor**



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