



Zukunfts(K)reise

How we can create
planet-compatible circularity

Zukunfts(K)reise

A journey to ideas for a
planet-compatible future

Co-created with the creativity
and imagination of schoolchildren
together with the systems
perspective of scientists

Forests, birds, fish, foxes, and every single living being on Earth play a role in the web of life, in the cycles of nature. Each and every one of them. Including us humans.

And yet: our quest for ever more and ever faster is pushing the Earth out of balance. Our society is based on a level of resource consumption that Earth cannot endure.

We are now at the brink of potentially devastating changes that threaten our own livelihood: climate crisis, mass extinction, destruction of habitats, and pollution of rivers, lakes, oceans, forests, meadows, and air.

We must find another way! But how?

Simply stopping would not be enough, we must actively build a planet-compatible society and repair the damage we have caused. Together!

For this to work, everyone's ideas are invaluable, including yours!

Ready for a journey into the future? Then join us in finding out how we can build relationships with the Earth and with each other in circles!



Earth family

As cities divided more and more from wild lands, knowledge diminished about how humans, trees and squirrels can live in communion. People still take care of domesticated animals, but have less and less connection to the wild world.

One afternoon, young Emma set out for a ride with her beloved horse Dream. They wanted to explore a new route leading away from the suburban area. Not much is left from the forest that there once was. Today, rows after rows of various fruits and vegetables were cultivated in new varieties the local soil had never grown before.

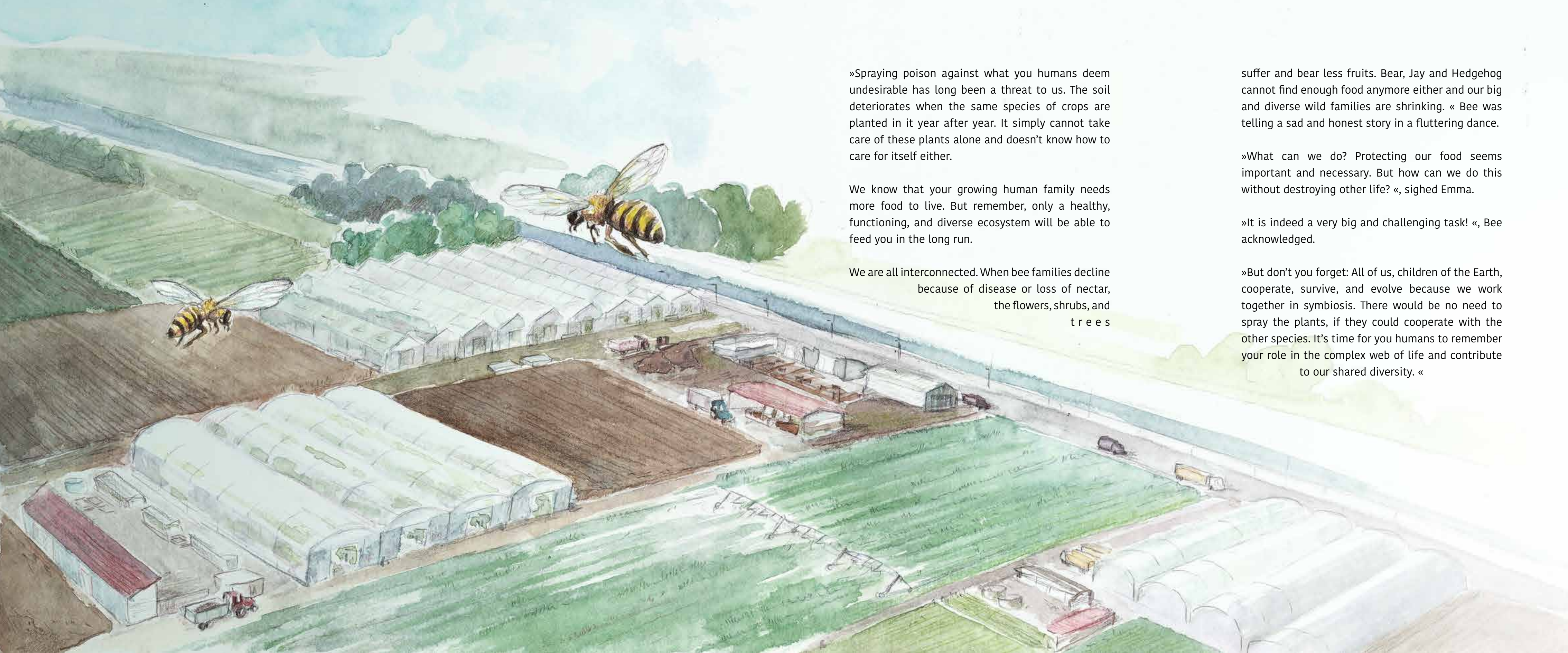
Suddenly, a gust of wind carried a swarm of chaotically buzzing bees. The horse jumped and before long, Emma was flying through the air and landing in the dust.

As she rose up, she found the swarm of agitated bees right in front of her face.

»We didn't intend to scare you«, Bee explained, »A gust of wind carried a poisonous cloud over the fields, and we lost our orientation. «

»What poisonous cloud? Why can't I see it? «, asked Emma, gently holding out her hand for her flying friend to rest on it.





»Spraying poison against what you humans deem undesirable has long been a threat to us. The soil deteriorates when the same species of crops are planted in it year after year. It simply cannot take care of these plants alone and doesn't know how to care for itself either.

We know that your growing human family needs more food to live. But remember, only a healthy, functioning, and diverse ecosystem will be able to feed you in the long run.

We are all interconnected. When bee families decline because of disease or loss of nectar, the flowers, shrubs, and trees

suffer and bear less fruits. Bear, Jay and Hedgehog cannot find enough food anymore either and our big and diverse wild families are shrinking. « Bee was telling a sad and honest story in a fluttering dance.

»What can we do? Protecting our food seems important and necessary. But how can we do this without destroying other life? «, sighed Emma.

»It is indeed a very big and challenging task! «, Bee acknowledged.

»But don't you forget: All of us, children of the Earth, cooperate, survive, and evolve because we work together in symbiosis. There would be no need to spray the plants, if they could cooperate with the other species. It's time for you humans to remember your role in the complex web of life and contribute to our shared diversity. «



Excitement propelled Bee back into the air, closer to Emma's face.

»Just imagine for a second! What if you combine your advanced technological knowledge with the wisdom of nature? All plants and animals know how to support each other with shade, warmth, healing, and nutrients.

Bees would return to this meadow and help pollinate. Birds would be back nesting in the trees, feasting on the insects, and herbivores would fertilize the soil, carnivores would keep their populations in check. Imagine a self-sustaining food forest. Everyone would be welcome and nurtured! «

»What if we remembered the meaning of living in cooperation? Perhaps we could find new ways to enjoy nature's gifts and give something back in return? «, Emma smiled with hope. »I think I can find people who would be eager to explore how this could work! «

»Oh, I am sure! «, exclaimed Bee, »Out of anyone in our Earth family, you humans know the power of imagination best. You know how to reimagine your life from its roots. Human creativity and intelligence are admirable! You give me hope, little girl.

We need everyone who imagines and follows their dreams of a better future for all! «

A Living Home

Not long ago, when people needed shelter, they traveled far and wide in search of a beautiful piece of land to build their homes. They formed communities to share food, stories, time and space. As the villages and cities became denser and more crowded, it became increasingly difficult to find clean and quiet places to build their new homes.

Like many others, Manuel was looking for a special piece of land with beautiful views and fresh air. His wish was to spend time with his family closer to nature. You see, like most people, Manuel has a stressful job in the city and is longing for balance. The land he eventually found sat right next to the last old forests in the area. Wildflowers, trees, and mushrooms were growing freely, claiming the land as their own.

On a beautiful morning, shortly after sunrise, Manuel arrived to inspect the site for the construction of his new house. As he strolled through the tall grasses and young trees, he felt his dreams of comfort and peace finally within reach.

Suddenly, he spotted something moving on the garden's edge. It was a vixen, gliding gracefully

towards him. »Is this your sincere wish, to use this land for your own shelter and compromise all those already living here?«, Vixen inquired. The man was surprised and listened attentively.

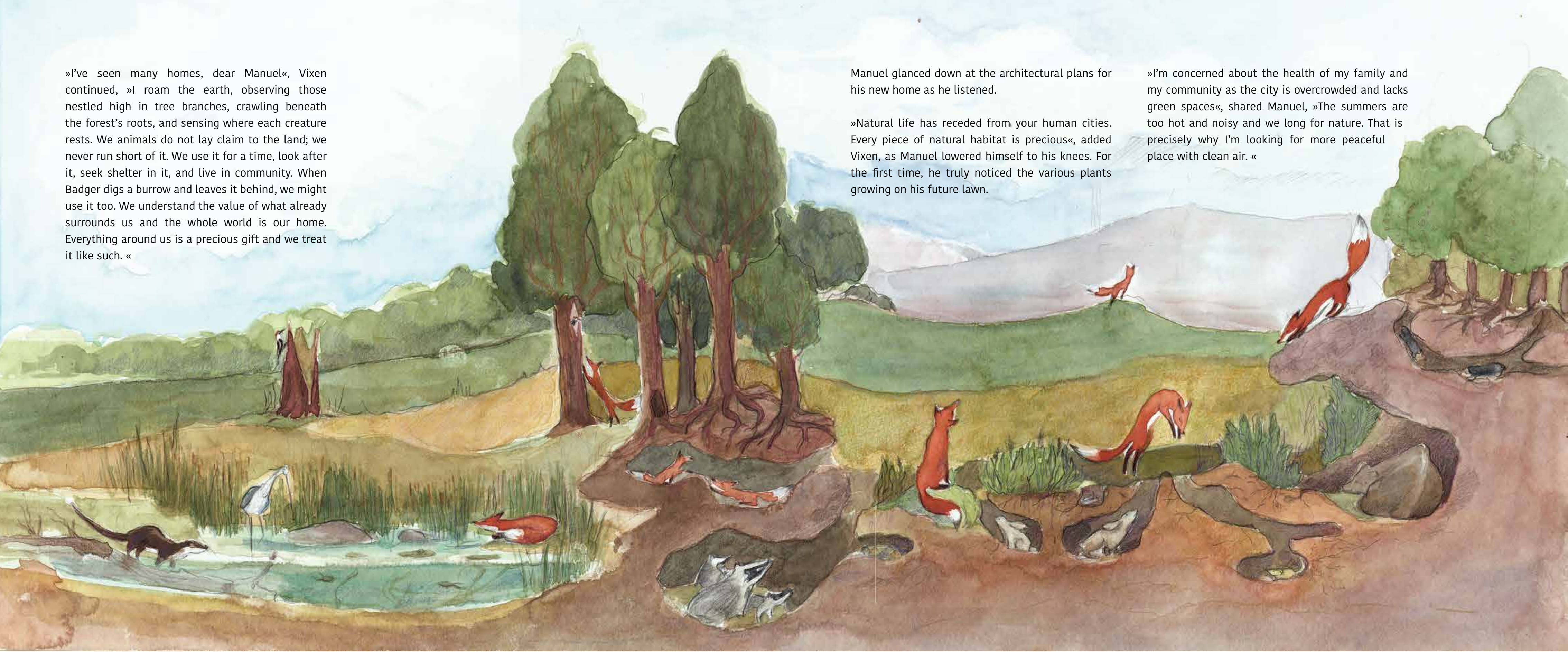


»I've seen many homes, dear Manuel«, Vixen continued, »I roam the earth, observing those nestled high in tree branches, crawling beneath the forest's roots, and sensing where each creature rests. We animals do not lay claim to the land; we never run short of it. We use it for a time, look after it, seek shelter in it, and live in community. When Badger digs a burrow and leaves it behind, we might use it too. We understand the value of what already surrounds us and the whole world is our home. Everything around us is a precious gift and we treat it like such. «

Manuel glanced down at the architectural plans for his new home as he listened.

»Natural life has receded from your human cities. Every piece of natural habitat is precious«, added Vixen, as Manuel lowered himself to his knees. For the first time, he truly noticed the various plants growing on his future lawn.

»I'm concerned about the health of my family and my community as the city is overcrowded and lacks green spaces«, shared Manuel, »The summers are too hot and noisy and we long for nature. That is precisely why I'm looking for more peaceful place with clean air. «





»The land we stand on, the site of your future home, Manuel, is already full of life«, Vixen replied,

»Just as a tree in the forest that offers shelter, sustenance, protection, and breathing air for all living beings, your garden is providing for every living being in it. It wasn't always this way, but it has been reawakened. Earth knows how to regenerate herself. Hmm... How about building a house for all of us? «

»What if my house could become an extension of wild nature, capable of providing food and shelter for more different species rather than just mine? And what if I used all my skills and knowledge in cooperation with yours? «, asked Manuel. A flame of hope lit the Vixen's deep brown eyes. »After all, we humans are also an integral part of nature. It seems we've simply forgotten our interdependence with the wild world. «

Manuel rose to his feet casting his curious gaze toward the old, overgrown farmhouse. He smiled and turned to Vixen.

»Perhaps we can start with what's already there. «

Shared adventures

Like any creature that runs, flies, crawls, or swims, humans have always been on the move. Since unremembered times, they have traversed the Earth. Only the reasons and ways of moving themselves and their belongings have changed.



Until today, we humans have ingeniously devised a variety of vehicles to accelerate our mobility. Travelling however, once an adventurous, seasonal, and essential pursuit, has now become a daily, monotonous activity.

One spring afternoon, Eva and Luna drove separately to the suburbs of the city to see the opening of a new large sports field.

The field offered a large parking lot and the natural ground was almost fully covered with artificial surfaces for running feet and rolling tires.

At the busy parking lot, the two friends struggled to find vacant spots for their cars.

Once successful, Eva's dog Kami rushed out of the car, enchanted by thousand suburban scents, and disappeared. So Eva and Luna spread out to find him.

Eva searched the nearby park. As she approached the grove of ancient poplar trees, a gentle breeze rustled through the branches and Eva could not help but sneeze. She had forgotten she was allergic to pollen.

»I'm so sorry to disturb you«, whispered Poplar and Eva listened surprised. »I have to release my pollen, so new poplar trees may flourish«, the tree continued, »The wind is our friend because it carries our pollen across the land. This is the only way we can form our seeds, take root elsewhere and transform barren soil into lush forests. Our roots are the pillars of the living world. «

Eva stood in awe and absorbed each word carefully. She could hardly wait to share it with her friend.

Meanwhile her friend Luna ran onto the lawn further down the park. Suddenly, bird droppings landed right in front of her feet. Startled, she looked up and saw a Jay bird sitting high above her on a power line. »I didn't mean to do this«, Jay chirped, »I am sorry. «

Confused, Luna watched the bird. Jay flew down, sat in the grass in front of her, and broke the silence: »I think I might have indulged in too many rosehips today«, the bird confessed, »Now, it's time for the seeds to find their way back to the soil. When we birds eat them, we help them to spread, allowing them to grow elsewhere. «

Luna smiled sympathetically and touched; Jay answered with a joyful song of gratitude and took off into the vast expanse of the sky.



At the same time, Kami was playing around the small bushes, following inviting scents, only to find his fur adorned with burdocks. »Thanks for the ride«, whispered one of the burdocks.

»Oh, be my guest«, Kami responded, »I'm not always a fan of hitchhikers in my fur, but I don't mind you. I'll find a good place to help your seeds find their new home. «

»It takes some courage for us to travel! «, Burdock chimed in, »It's a bit of a gamble for us, you know, where this journey would take us. «

Kami raced back towards the sports field. As he arrived, both girls cheered with excitement to see him.

Luna and Eva told each other about their encounter with Poplar and Jay. Kami showed his burdock-covered fur. »Burdock is yet another plant that relies on furry travelers like me. «, said Kami, »When something travels in nature, it does so with purpose. Plant seeds travel to find a new home and bring forth new life. What an adventure it might be for a burdock to cling to my fur, for pollen to dance in the wind, or for seeds to pass through Jay's body! «

»And our way of moving is so different«, exclaimed Eva, looking closely at one of the prickly burdocks, »Just look at that sports field, the parking lot, and the entire city. Everyone is moving on their own, we don't really share this experience. Driving cars individually takes up so much space and energy, crowding cities. And it's, well, lonely. «

The three friends looked at the city in the distance. »What if we could not only get around but share adventures together? What would our daily commutes look like? «, asked Luna with contagious excitement,

»Just imagine how different and fascinating our world could be.... Where should we start? «



The Dream of the water

The very first spark of life on our home planet happened in the embrace of water. It is where tiny bacteria took their first steps into existence. Not only humans, but every living creature on Earth relies on water daily. Water takes many forms—rivers, lakes, seas, glaciers, or clouds—and shapes the landscapes and the climate that make our world unique. All species, including us humans, owe their evolution to the life-giving touch of water.

Sara and Tom's family also had a special connection to water. The lake that surrounded their city was their favorite place to spend their leisure time. They enjoyed their walks along the lake even though most of the shore was swallowed up by the sprawling city and farmlands.

One warm afternoon, Sara and Tom were sent to the supermarket to buy food for dinner. As they approached the fish section in the store, they saw only empty shelves. Sara and Tom exchanged worried glances as they heard a kind shop assistant behind them. »I'm sorry, kids. The supply of fish is struggling«, she said. Sara and Tom bought fresh vegetables instead for dinner and went to the lake for a stroll.



On the shore, a local fisherman was casting his line with no luck. His bucket remained empty.

»The water has changed«, sighed the old man, »It seems to me that there is more trash than fish in the lake. I used to come here every Sunday to catch some fish for my family. But now I mostly sit idle and watch the waves. «

A few steps away, the kids sat down to watch the surf. While they were lost in their thoughts, Sara noticed a movement in the water.

»Look, Tom! Something is moving there! «, she shouted.

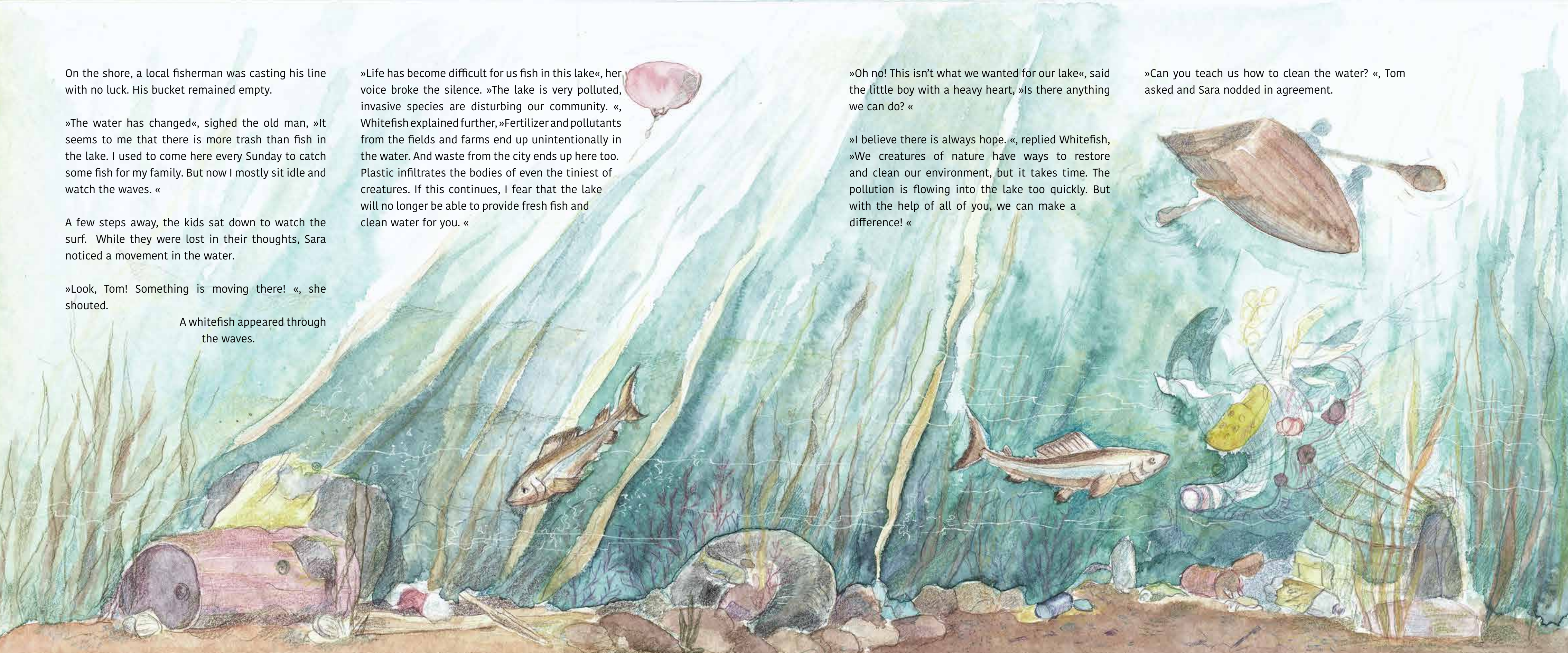
A whitefish appeared through the waves.

»Life has become difficult for us fish in this lake«, her voice broke the silence. »The lake is very polluted, invasive species are disturbing our community. «, Whitefish explained further, »Fertilizer and pollutants from the fields and farms end up unintentionally in the water. And waste from the city ends up here too. Plastic infiltrates the bodies of even the tiniest of creatures. If this continues, I fear that the lake will no longer be able to provide fresh fish and clean water for you. «

»Oh no! This isn't what we wanted for our lake«, said the little boy with a heavy heart, »Is there anything we can do? «

»I believe there is always hope. «, replied Whitefish, »We creatures of nature have ways to restore and clean our environment, but it takes time. The pollution is flowing into the lake too quickly. But with the help of all of you, we can make a difference! «

»Can you teach us how to clean the water? «, Tom asked and Sara nodded in agreement.



»Those of us who live in harmony with Earth rarely need to clean up. The concept of waste does not exist in nature. What may seem like surplus to one species is the sustenance for another. Nutrients circulate in an intricate web, in which each creature relies on one another. They take only what is abundant and what they essentially need. «, explained Whitefish.

»So if we catch too much fish from the lake, are they missing for cleaning

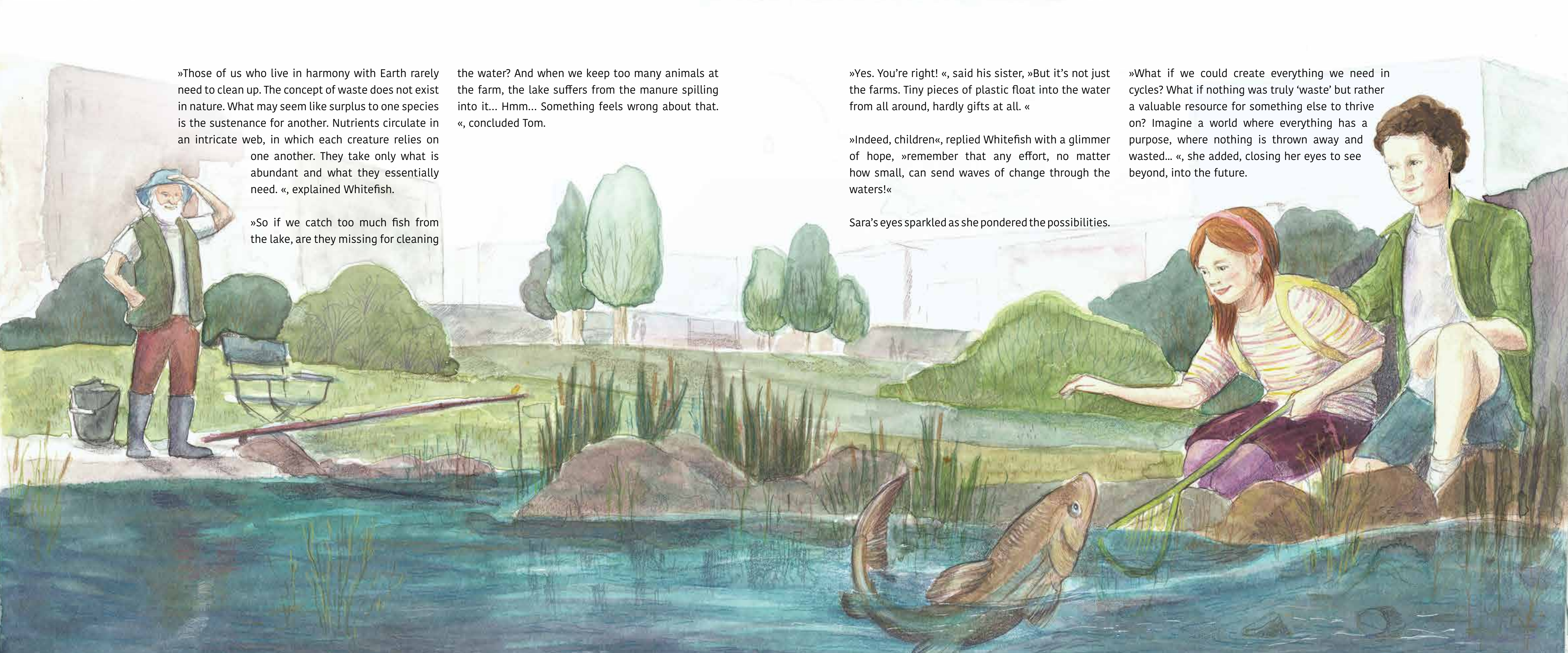
the water? And when we keep too many animals at the farm, the lake suffers from the manure spilling into it... Hmm... Something feels wrong about that. «, concluded Tom.

»Yes. You're right! «, said his sister, »But it's not just the farms. Tiny pieces of plastic float into the water from all around, hardly gifts at all. «

»Indeed, children«, replied Whitefish with a glimmer of hope, »remember that any effort, no matter how small, can send waves of change through the waters!«

Sara's eyes sparkled as she pondered the possibilities.

»What if we could create everything we need in cycles? What if nothing was truly 'waste' but rather a valuable resource for something else to thrive on? Imagine a world where everything has a purpose, where nothing is thrown away and wasted... «, she added, closing her eyes to see beyond, into the future.



»Out of anyone in our Earth family, you humans know the **power of imagination** best. You know how to reimagine your life from its roots. «, Bee says to Emma.



Let us use our creativity to shape our society in harmony with Earth!

What if...

... we clean up pollution and remediate damage we have already caused?

... we integrate our society into the circles of nature?

... we use our resources deliberately and carefully for building a sustainable future?

... we produce no waste any-more?

... we reuse, rearrange, and repurpose, what is already there?

... we share mobility?

Making our society planet-compatible – is it even possible?

Despite many ecological and social crises and fast approaching tipping points in the Earth system, science continues to show: yes, it is possible! However, not everything desirable is feasible. Earth has its boundaries, many of which have already been transgressed. A sustainable society must operate within the limits of the planet. In certain cases, we even need to actively clean-up some of the emissions from the past. To achieve this, we already have most of the necessary technologies, resources, knowledge, and skills.

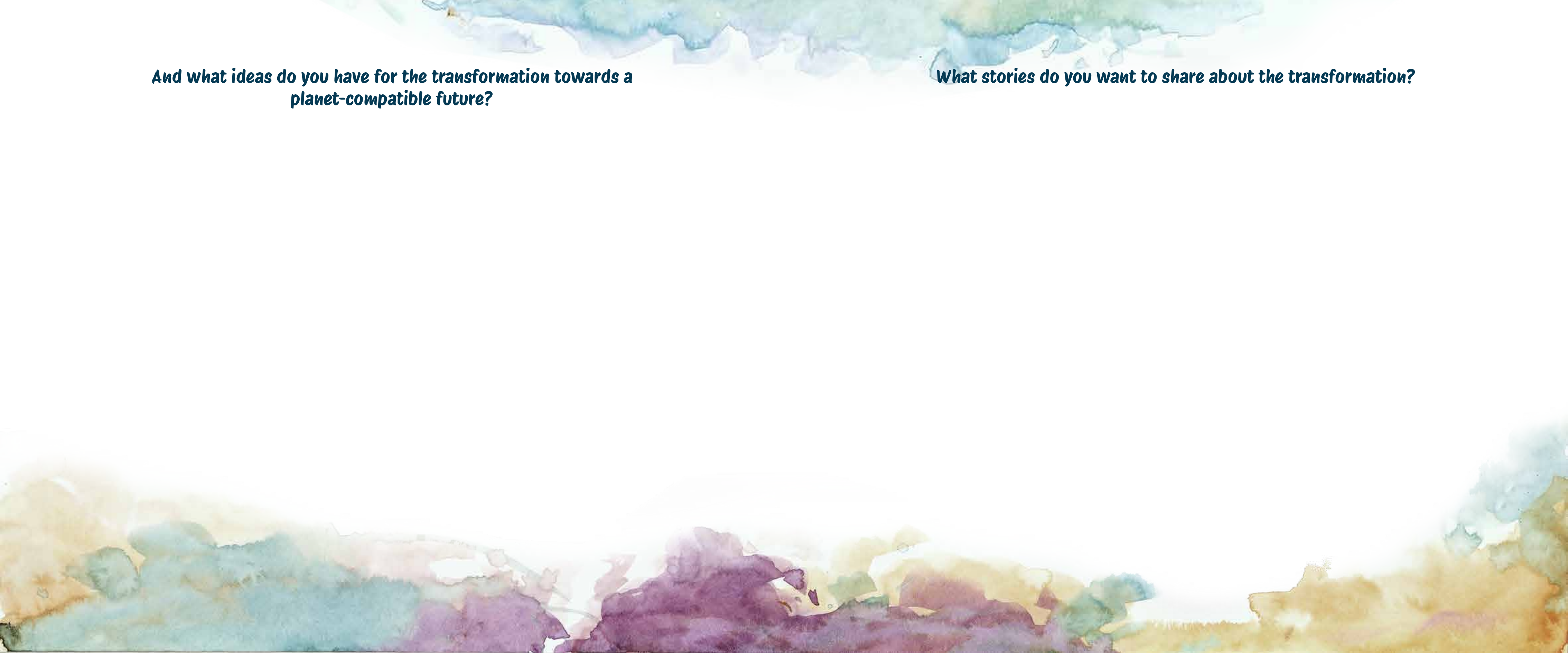
First and foremost we need the collective imagination that a better future is possible, achievable, and aspirational! And we need creativity in organizing our society: How do we set priorities? How will we work together? How do we integrate in the Earth system? How do we learn and share experiences?

Discover some ideas for a circular metamorphosis of a city on the transformation picture behind this page!

Want to know more? Explanations on the scientific background, exercises, tasks and further inspirations can be found at the end of this book and in the accompanying materials online!





A watercolor illustration of a landscape. The top of the image features a blue and green sky with soft, blended colors. The bottom of the image shows a horizon line with various colored washes representing mountains and trees. The colors include shades of blue, green, yellow, orange, and purple, creating a soft, painterly effect. The central area of the image is a plain white space where the text is located.

And what ideas do you have for the transformation towards a planet-compatible future?

What stories do you want to share about the transformation?

Scientific background

Why does the Earth have boundaries?

Many anthropogenic drivers, from CO₂ emissions over land appropriation to freshwater pollution, are driving the Earth system ever faster towards **tipping points**.^{1,2} Crossing tipping points has potentially **devastating consequences**³ for our society. Examples of such tipping elements in the Earth system are the Amazon rainforest or the polar ice sheets.

The concept of **planetary boundaries**⁴⁻⁶ was developed to make tipping risks more tangible. It comprises nine essential Earth systems: climate, biodiversity, freshwater, land use, biogeochemical cycles, ozone, ocean acidification, aerosols, and novel entities. If the impacts on all of these categories remain below the defined thresholds, the Earth system remains in the stable state that we know with certainty to be preferable and supportive for human societies. In contrast, transgressing these boundaries leads to increased risks of the Earth system transitioning to a different state that is no longer supportive for human civilization.⁷

How can tipping risks be reduced?

Through a **fast defossilization of the energy system**,^{8,9} replacing coal, oil and gas with renewable energy,¹⁰ transforming **agriculture**,¹¹ and establishing a **sustainable circular economy**.¹² Since the production of resources and technologies for the transformation also causes significant environmental impacts at planetary boundaries,¹³ all measures that reduce the need for resources help to minimize tipping risks. For example, if we align our energy demand with the availability of solar and wind—the paradigm of the **sunflower society**¹⁴—much less energy storage capacity would be required, which in turn would save significant amounts of materials, energy, time, and money.

The circular economy follows the same logic: rethink, reuse, reshape, renovate, adapt, recycle what already exists. Just as nature functions in almost perfectly closed cycles, circular economy aims to reduce resource consumption and the associated environmental impacts as much as possible.¹⁵⁻¹⁷

And finally: cleaning up!

Atmospheric CO₂ concentration is already well above the save limit of 350ppm, requiring us to **clean-up** a part of the emissions we have released into the atmosphere since the industrial revolution.¹⁸⁻²¹ **Cleaning** up past pollution and repairing its damage is also necessary for other severely deteriorated Earth systems, such as restoring habitats²² or ridding the oceans from plastic pollution.²³

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Gratitude

This book and its accompanying learning material are the result of ideas and thoughts of many creative minds, particularly of schoolchildren from 3rd to 6th grade attending the gifted program in Rorschach in 2023. This program is run in collaboration of the primary schools Rorschach and Rorschacherberg together with the Pedagogical University St. Gallen (PHSG).

Making the stories more accessible and helping to test and develop learning materials, the following students were involved during autumn semester 2023.

With great interest, commitment, and creativity have they imagined and envisioned a future circular society. In this endeavor, they received support from scientists at the Laboratory for Technology and Society from the Swiss Federal Laboratories for Materials Science and Technology (Empa) in St.Gallen, who paid close attention to physical and ecological feasibility.

The children were guided by the team for gifted education at PHSG, who furthermore helped co-creating the stories in this book and/or developed learning materials for the use in regular education classes.

Bushati Lorina, Christopher Lorelayn, Dauti Lina, Dörig Lara, Gähler Samuel, Geldmacher Lars, Gerschwiler Nicolas, Hozdic Omar, Lins Yalina, Maurer Lia, Piccolo Nerea, Specker Arjan, Walser Linda

Bushati Riona, Hoch David Gregory, Pfaffinger Leo, Thür Stella, Farizi Jon, Hegnauer Andrin, Marchlewitz Mathilda, Obmascher Annika

Andrin Büchel, Heinz Böni, Marcel Gauch, Martin Gasser, Andreas Gerber, Roland Hischier, Nadia Malinverno, David Mennekes, Hauke Schlesier.

Michael Zingg, Anouk Perret, Patrick Kunz, Noah Hutter, Robert Furrer, Luca Beck

Pedagogical lead, process management

Marion Rogalla, PHSG

Process design, artistic lead, and illustrations

Maya Ivanova

Initiation, scientific lead, and project lead

Harald Desing, Empa

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How do we build a society that is organized in harmony with Earth? That is inspired by the cycle of life and integral part of nature? We will need many great ideas and this book would like to trigger creative thoughts: how can we create a future that respects planetary boundaries?

Let's embark in a journey together, in search for ideas on how to organize our relationships to Earth and each other in circles!