

Back to Kalaysis: navigating the nexus

The 2024 IPBES Nexus Assessment highlights how biodiversity, water, food, health, and climate are deeply interconnected. Together, these five elements form a “nexus”, where actions in one area (e.g. food production) directly influence outcomes in others (e.g. water quality, biodiversity, human health). In total, the Assessment presents six distinct scenarios, each with specific economic, social and environmental outcomes. This story has been inspired by the six scenarios outlined in the IPBES Nexus Assessment, and attempts to illustrate how we think they might look in practice.

Introduction: Leaving Arboris



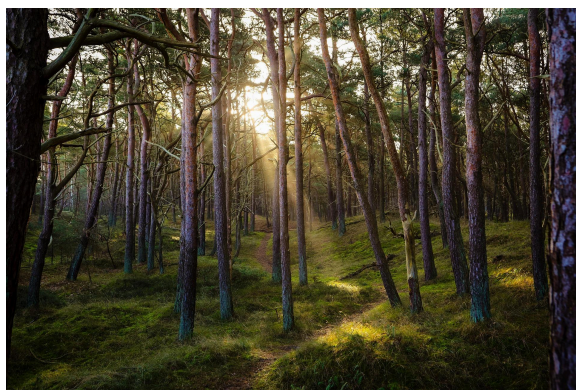
Two years had passed since Aisha and her parents, Carlos and Ana, had arrived in the city of Arboris. They had arrived as refugees, tired and scared, after fleeing their home city of Kalaysis while it burned.

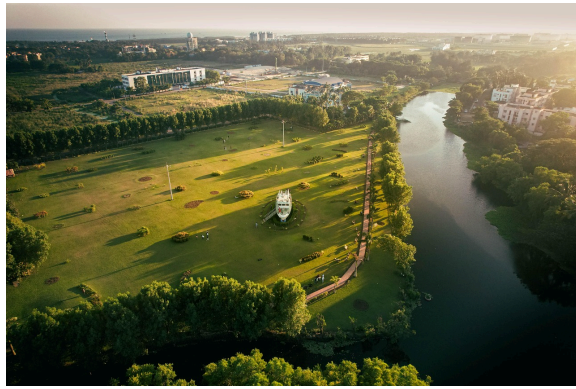
Much had changed since they had first arrived in Arboris. Aisha's father Carlos had found work helping to maintain the city's water restoration projects. Her mother Ana spent part of her time volunteering in one of Arboris' community gardens. The lush gardens, vibrant markets and salty sea air of Arboris, which had once seemed so alien

to them, had now begun to feel like home. Their memories of panic and destruction in Kalaysis had also begun to fade.

Arboris was unlike any city Aisha had known before. Forests stretched into neighbourhoods instead of being banished to the edges. Wetlands absorbed stormwater before it could flood the streets. Solar roofs shimmered above houses, while community gardens filled spaces between buildings. The city had learned something many others had not: biodiversity, water, food, health, and climate were not separate challenges to solve one by one. They were parts of the same system, with nature at its core. By putting nature first, Arboris safeguarded the ecosystems that provided clean rivers, sufficient food, and cool, clean air. New technologies and a shift in attitudes helped people to live comfortably by using only what they need, and re-using wherever they could'.

Aisha and her family had quickly become accustomed to this way of life. They had experienced first-hand what it meant when nature could no longer support relentless overexploitation by humans. They knew what was at stake. That was why they had agreed to continue sharing a home with the Stephens family - Julia, Mark, and their son, Leo - who had welcomed them so warmly when they first arrived in the city. After all, the Stephens' home provided plenty of space for both families, and by now the Stephens had become their close friends, far more than just their hosts.





One evening, as both families sat together around the dinner table, Aisha was surprised to hear the conversation drift back to Kalaysis. Since arriving in Arboris, she and her family hadn't spoken much of their home city, hoping that the memories would eventually fade. But her father Carlos had discovered an old photograph of Kalaysis, taken decades earlier. To Aisha's amazement, the photo showed a tree-lined street, full of children playing, near a fountain where clean water flowed freely.

"Kalaysis... used to look like that?" Aisha asked quietly.

Carlos nodded. "Long before your time."

Silence fell upon them for a moment. Aisha stared at the photograph. Memories came rushing back to her: the sirens, the blackened towers, the empty rivers, and the heat that seemed to linger even after nightfall. For decades, the leaders in Kalaysis had pursued growth at any cost. Forests were cleared to make space for this relentless expansion, powered by fossil fuels which choked the air with smoke. People consumed more and more every year, their endless appetite stoked by the megacorporations and governments who ignored all of the warning signs.

When food started to become scarce in Kalaysis, production was intensified, and crops were pumped full of artificial fertilisers. When these chemicals poisoned the water, rivers were buried, and expensive water treatment plants were built to clean the water supply. As the air began to boil, more fuel was burned to cope with the heat.

No one saw that all of these problems were linked.

Eventually, nature couldn't take it any more. Fish disappeared from rivers and seas. Heatwaves and wildfires intensified, and water became scarce and polluted. When

rainfall did come, it quickly flooded the cracked, barren earth, and poured into the city. People became hungry, and sick.

Aisha found it impossible to reconcile these memories with the peaceful city she saw in the photograph. As the conversation continued around her, an idea started to stain her mind: if Kalaysis looked like this once, could it look like this again?

Could her home city be saved?



By the end of the week, Aisha couldn't keep the idea to herself any longer. As the conversation lulled during dinner one evening, Aisha blurted out suddenly:

"I want to go back!"

The table fell silent. Ana looked down at her plate. Carlos exchanged a brief glance with Julia and Mark.

"Back to Kalaysis?" Julia asked gently.

Aisha nodded. "Yes! Someday. I know it's not ready yet. But I keep thinking about everything we've learned here. Whether Kalaysis could be rebuilt... and whether I could help."

No one laughed. Yet nobody seemed entirely convinced either.

Later that evening, she found Leo sitting on the terrace overlooking the dark outline of the forest. He looked up from his notebook, smiling as she approached.

"What you said during dinner..." he began. "That was really brave! But do you really want to go back there, after everything?"

Aisha was quiet for a moment. "I think so. Do you think I can do it? Do you think I can actually help Kalaysis?"

"Of course I think you can do it! But... I'm not sure if you're quite ready yet. There's so much more you need to see first."

Aisha frowned. "What do you mean?"

"So far, you've only seen two outcomes: Arboris, and Kalaysis." He closed his notebook and leaned back in his chair. "But Arboris didn't appear overnight. And it isn't the only path people have tried. Different cities responded to the same crises in completely different ways. Some focused on producing as much food as possible. Others prioritised climate technology above everything else. Some guarded nature behind high fences. Others kept exploiting it until there was almost nothing left, like Kalaysis."

Aisha listened quietly.

"Some of those cities succeeded in certain ways," Leo continued. "But they often created entirely new problems for themselves. Most learned that solving one challenge whilst ignoring the others doesn't work for very long."

"And you've seen all of them?"

"Not all," Leo admitted. "Some I know because of school projects and exchange programmes. Some because friends or family live there, like my aunt, Ines, who lives in Pania. In fact, I haven't been to visit them in quite a while..."

"What are you saying?"

Leo smiled. "I'm saying that if you really want to help Kalaysis someday, you need to understand more than Arboris. So let's go! We can visit my friends, like my pen pal Danny, my mentor, Priya, who lives in Tessera, and Aunt Ines of course! It will be good research before I start my internship, too."

Once they had discussed the idea with their families, their plan began to take shape. Neither Carlos nor Ana liked the thought of Aisha travelling so far from Arboris, but after many conversations and much careful preparation, they eventually agreed.

And so it happened that before long, Aisha and Leo found themselves boarding a train heading northeast. As they took their seats and watched the landscape begin to roll past the window, Leo folded out his map and showed it to Aisha.

"Our first stop," he said, "is Pania."

The city of Arboris was inspired by the IPBES Nexus Assessment "Nature-first" scenario:

- *Strong environmental protection, ecosystem restoration, and sustainable resource use create major benefits for biodiversity.*
- *Healthy ecosystems support climate stability, clean water, food security, and human wellbeing, although some trade-offs remain, such as competition for land between conservation and food production.*
- *Long-term success depends on integrating nature, climate, water, food, and health rather than treating them as separate challenges.*

The city of Kalaysis was inspired by the IPBES Nexus Assessment "Nature overexploitation" scenario:

- *This scenario has negative impacts on biodiversity, food, human health, climate, and variable impacts on water.*

- *It is characterised by overconsumption of natural resources, unsustainable energy demand, including fossil fuels, and weak environmental regulation, exacerbated by delayed action.*

Chapter 1: Pania – Abundance at a Cost



The smell reached Aisha before the city itself came fully into view. Warm bread, fried spices, grilled vegetables, fermented sauces – the air itself seemed heavy with food.

As the train curved around the bay, Pania rose from the coastline in layers of green terraces and crowded housing blocks wrapped in climbing crops. Rooftops overflowed with gardens, and old concrete towers had disappeared beneath vines, irrigation pipes, and stacked greenhouse platforms glowing amber in the afternoon sun.

Chaos erupted around them as soon as they stepped off the train and got out of the station. Porters pushed carts piled high with fruit, vegetables, meat and fish through jostling crowds, weaving between market stalls loaded with every type of produce that



Aisha could imagine. Market vendors shouted over one another, competing for the crowd's attention, whilst music pulsed through the streets and into the station.

Leo almost had to shout, just so that Aisha could hear him above the crescendo of the market. "This place never slows down!"

Aisha could hardly believe her eyes. Everywhere she looked, people were growing, transporting, sorting, preserving, cooking, drying, or selling food. Even the station walls held vertical herb gardens dripping with basil and mint.

Once they emerged from the station, and began walking through Pania, Aisha realised what she *wasn't* seeing. There were no open spaces left untouched - no quiet parks to savour a quiet moment, no fields for people to gather or for children to play. A group of children ran past them, weaving between stacked crates and planting beds, their game constantly interrupted by adults calling after them not to step on anything.

The city seemed built around a single promise: no one here would ever go hungry again. But it was clear that this didn't leave space for much else.

Aisha was distracted by a woman waving at them from across the station square. She wore sturdy jeans, heavy boots, and a shirt with rolled-up sleeves. The woman smiled at them warmly as they approached, and quickly pulled Leo into a deep hug. Releasing him after a moment, the woman stepped back to look at Leo properly.

"You've grown!" she exclaimed. "It's been too long."

"Hi, Aunt Ines." Leo replied, smiling.

She turned to greet Aisha.

"You must be Aisha," she said warmly. "I'm Ines. I'll be showing you two around Pania today. Although Leo already knows his way around – he spent half his childhood here."

Leo sighed lightly. "And apparently nothing has changed."

Ines smirked. "Some things have. Come on, I'll show you."

As they walked through Pania together, Ines explained how the city had once suffered devastating food shortages. The city had relied on food shipments from other cities,

and when droughts and heatwaves made food scarce, the shipments stopped arriving. After that, Pania transformed itself completely. Every available surface became productive land. Historic parks, sports fields, and even schoolyards were converted into plots and farmed intensively, with genetically-engineered crops capable of surviving heatwaves and unstable rainfall. Laws required buildings to produce food as well as provide shelter.

"We needed to make sure the shortages would never happen again." Ines explained. "And now... people eat!"

There was pride in her voice, and Aisha understood why. In Kalaysis, fresh food had become a luxury long before the evacuations began. She remembered empty shelves, ration queues, and the quiet panic that settled over her parents every time prices rose again. But Pania overflowed with abundance.

Ines took them through one of the central market districts, where cafés and restaurants spilled onto crowded streets. Huge pots simmered on open flames while cooks distributed meals, piling plates high with food.

Noticing Aisha's amazement, Ines explained, "when food became plentiful again, people quickly made up for lost time. The city encouraged people to consume as many calories as possible, especially protein. It was the fastest way to eliminate malnutrition."

As they passed a table full of discarded plates, all still laden with food, Aisha wondered how much of that urgency still remained, and how much had simply become habit.

That afternoon, Leo suggested they travel beyond the city centre to the outer production zones. They boarded a crowded tram carrying workers toward the agricultural belts which stretched far beyond Pania itself.

Slowly, the city changed. The dense neighborhoods and lively markets gave way to endless cultivated land. Rows of crops spread across the horizon in rigid patterns broken only by irrigation systems and processing facilities. Massive greenhouses shimmered beneath the setting sun while automated harvesters crawled methodically through the fields.



Aisha noticed the silence almost immediately.

Back in Arboris, the landscape had hummed with insects, birds, and moving water. Here, the air felt still. The only sounds came from machinery and distant transport drones crossing overhead.

"Most of the forests were cleared years ago," Ines explained as they walked beside one of the irrigation canals. "It's a shame, but the city needed more space to produce food."

The canal water looked thick and green below them, its surface coated in algae that clung to the concrete edges.

Ines sighed. "We use fertilisers to maximise production from the fields. But the fertilisers wash into the waterways when it rains, and it builds up over time. Which means that most districts rely on water filtration systems now."



Leo glanced at the slow-moving water. "Which means more energy, more resources... more cost."

Aisha peered into the canal, searching in vain for any sign of life in the dark water. Crouching, she touched the soil near the water's edge. It crumbled strangely between her fingers – dry despite the constant irrigation.

Suddenly, a cluster of tiny drones buzzed over her head. They crossed into the nearby field, releasing clouds of synthetic pollen over flowering plants. Aisha watched them disappear into the distance. The sight unsettled her.

That evening, Aisha and Leo sat together on the roof of Aunt Ines' house, overlooking Pania. The city glowed warmly beneath them, and music drifted upward from the streets below. They sat quietly for a while, watching the city.

Finally, Aisha broke the silence. "They can't keep this going forever, can they?"

"No." Leo replied, sighing. "The more they intensify production, the more pressure they place on water systems, biodiversity, and the climate itself. And over time, soil loses fertility, water becomes harder to clean, and crops become completely dependent on chemicals and drones."

Aisha thought about the polluted canals, the disappearing forests, the silent fields.

Leo continued. "It works – until something breaks. And when it does, there's very little left to fall back on. A drought that's worse than expected, a failure in the supply systems, rising costs people can't afford. When everything depends on pushing the land harder each year, there's less room for error."

Aisha nodded. She understood – but she also couldn't forget how Ines had described the food shortages, and the panic and suffering they caused in Pania. It reminded her of Kalaysis, of empty shelves, and rationing queues.

After a while, she responded, "What else could they have done?"

Leo looked at her thoughtfully. "They solved hunger, and millions of people survived because cities like this focused entirely on food security. But the problem is that they treated food as separate from everything else."

The next morning, Aisha and Leo boarded the train before sunrise. They rolled away from Pania, the city still half-asleep behind them. Aisha leaned her head against the window, watching fields, canals, and processing zones blur into one another. Somewhere in the distance, irrigation lines cut through the land in long geometric patterns, faint reminders of what they had just left behind.

Other cities, Leo explained, had taken very different paths to Pania. Nephra was one of them.

The city of Pania was inspired by the IPBES Nexus Assessment "Food-first" scenario:

- *Food production is prioritised above all else, helping to reduce hunger and improve nutrition through intensive agriculture and increased consumption.*
- *Nature, water and climate are placed under growing pressure as more land is converted for agriculture, water use increases, pollution rises, and greenhouse gas emissions continue to grow.*
- *Short-term gains create long-term risks: without strong environmental regulations and integrated planning, food systems become increasingly dependent on intensive inputs while biodiversity, water security and ecosystem resilience decline.*

Chapter 2: Nephra – When Climate Becomes the Only Measure

By the time Aisha and Leo arrived in Nephra, the rain had already begun.

Not ordinary rain. The droplets fell in strangely even intervals, almost too precisely spaced, and evaporated quickly when they touched the warm pavement. Aisha tilted her face upwards as they stepped out of the train station, watching silver clouds drift slowly above the city in neat formations.

“Engineered rainfall,” Leo explained. “Part of the atmospheric cooling network.”

The city stretched around them in pale tones of white, glass, and steel. Wind moved softly through elevated walkways lined with solar fabric canopies, while silent electric trams slid between buildings without drivers or visible rails. Compared to Pania, Nephra felt almost unnaturally calm. Nobody shouted. Nobody crowded the streets. Even the traffic seemed choreographed.



Aisha tightened her jacket around herself as they crossed the station plaza. She hadn't expected the air to be so much cooler in Nephra.

Leo led her up to a series of terraces overlooking Nephra's skyline. The clouds had parted, and every part of the city seemed to shimmer in the sunlight. Solar surfaces glinted while clean white wind turbines turned slowly along the waterfront. Beyond them, Aisha could see an expanse of green stretching towards the coast. Her heart fluttered at the exciting thought of exploring more peatlands and mangroves.



Following her gaze, Leo explained that Nephra had constructed artificial wetlands at its edges, as part of the city's flood-protection system. Looking closer, Aisha noticed how strangely regimented the area looked, with patches of green divided by neat blue threads as the artificial waterways carved

up the vegetation into an organised grid.

On the highest terrace, rising proudly above the city, stood Nephra's Climate Observatory. The building itself was almost transparent, with great glass walls that rose in a giant dome. As they approached the shimmering building, Aisha recalled her visit to the Skyloom Dome in Arboris, the scientific hub of the city. Excited by the memory, Aisha found herself eager to take a look inside the Climate Observatory.

As they entered the building, Aisha could see that the centre of the building formed a huge circular hall. Just like in the Skyloom Dome, hundreds of screens flickered with charts and figures. Here, the charts only displayed data related to atmospheric carbon concentrations, sea surface temperature, rainfall patterns, energy production and storage levels – all updated continuously.

Unlike the bustling markets of Pania, people here spoke quietly. Students sat in groups, comparing notes. Researchers strolled beside the screens, reviewing the data.

"I used to spend entire weekends here," Leo admitted. "Arboris partnered with Nephra on a youth climate programme a few years ago. We worked with researchers here to model future flood risks."

Before Aisha could respond, a voice behind them interrupted. "And Leo nearly drove everyone mad asking questions!"

They turned to see a woman approaching with an amused smile. Silver hair framed her weathered face, and she carried a tablet tucked beneath her arm.

"Dr. Elara Voss," she introduced herself, extending a hand toward Aisha. "Climate systems engineer... and survivor of Leo's endless curiosity."

Leo rolled his eyes, laughing.

Dr. Voss turned her attention to Aisha.

"Is it your first time here in Nephra?"

Aisha nodded.

"Then you've probably noticed," Elara said, gesturing toward the surrounding data streams, "that this city is built around a single mission: keeping our climate cool, and stable."

Aisha glanced at the moving projections above them. "And it works?"

"It worked even faster than we expected," Elara replied. "But it required coordination on a scale most places had never attempted. Everything here is shaped by our climate targets – energy, transport, industry, even land use."

She paused.

"And ultimately, that's the reason why Nephra still exists today. All our efforts have really paid off."

Concluding with this proud statement, Elara said a quick goodbye and returned to the group of students she had been overseeing. Aisha and Leo turned back to continue studying the large table at the centre of the room, where a large digital model of the city hovered above the table, shifting colours as it displayed various projections of temperature, rainfall, and carbon dioxide levels. Around them, screens continued to flicker with live models of storms forming over oceans, energy grids balancing supply and demand throughout the city, and emissions pathways recalculating in response to policy shifts.



Quiet for a moment, Aisha reflected on how different this all felt to her experience of Pania. Unlike in Pania, where the city's uncertain future felt unavoidable, here the future climate was no longer invisible or abstract. It had become something measured, tracked, and constantly adjusted – present in every decision, every system, every screen.

For a moment, this felt reassuring. But the longer Aisha stood there, the more she felt like something was missing from the room.

As evening started to fall, Aisha and Leo drifted out of the observatory, back to the terraces overlooking the city. Above them, clouds moved in slow, heavy formations, occasionally lit by distant lightning over the sea.

In Kalaysis, climate change had always felt distant – until it wasn't. Here, it felt managed and controlled. At the same time, it remained a constant presence, always lurking in the background.

By the time they returned to the streets below, the pavement was wet with the first rain of the night, reflecting the city lights in long, shifting lines. Elara had arranged for Aisha and Leo to stay overnight on the local university campus, so they headed back to their rooms quietly, thinking about life in Nephra.

The next morning, Leo suggested they walk through the older districts beyond the city centre. As they moved further from the observatory towers and research complexes, Aisha began noticing details she had missed the day before.

Every building surface seemed designed for efficiency. Windows adjusted automatically depending on sunlight exposure. Solar panels rotated slowly, following the sun. Public benches even folded away during hotter hours to reduce heat absorption.

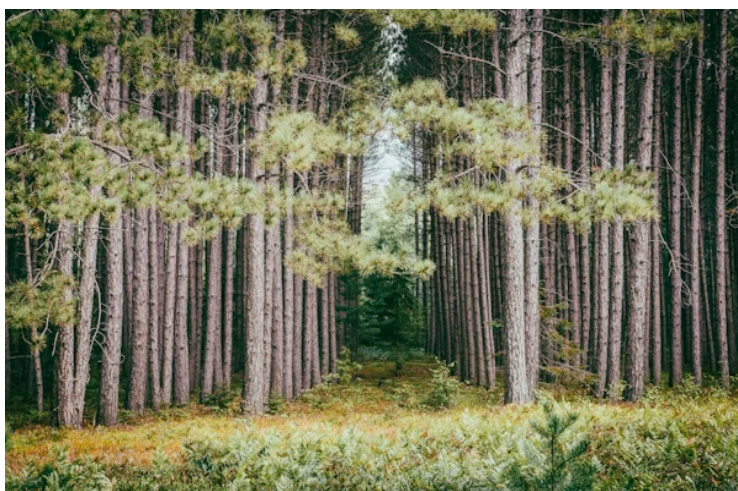
The city worked beautifully. And yet something about it unsettled her. There were parks, but nobody lingered in them. Crowds moved quietly and smoothly along the streets, and Aisha realised she had barely heard laughter since arriving. For a moment, she wondered whether a place could function so efficiently that there was no longer space left to simply exist within it.

They stopped beside a narrow canal which ran parallel with the street. The water looked perfectly clear, almost artificial.

"No algae!" Aisha observed, recalling Pania's thick, green waterways.

"No life either," Leo replied quietly.

Aisha frowned and looked closer. He was right. No insects skimmed the surface. No reeds grew along the edges. Even the water flow seemed mechanically controlled.



Eventually, their road came to a dead end, the way obstructed by a tall fence. Signs on the fence indicated that it contained one of Nephra's "reforestation zones". Peering through the fence, all Aisha could see was endless rows of

identical trees arranged in a rigid formation.

"Carbon forests," Leo explained.

Aisha was confused. "Why is it closed off?"

"To reduce human disturbance and maximise carbon absorption."

Aisha looked through the fencing again, and listened. The forest was silent. Not just peaceful, but completely silent. No undergrowth or fallen branches littered the soil

beneath the trees. Everything had been cleared and arranged for maximum efficiency.



Aisha and Leo began walking along the perimeter of the fence. After a while, they came across a dry riverbed, which emerged from the forest and continued on towards the city. Cracked mud spread across the ground where water had once

flowed.

"What happened here?" Aisha asked, concerned.

"This river was redirected years ago," Leo answered. "The cooling systems, carbon capture infrastructure, energy grids - they all needed stable water supplies."

"This doesn't feel right," Aisha responded with a sigh.

Leo sat himself down on the bank of the empty riverbed. "I know. Nephra did what they set out to do - they controlled the climate. But they approached the climate crisis as though carbon dioxide was the only thing that mattered."

Aisha remained silent.

"When every system becomes organised around climate metrics alone," he continued, "other parts of life slowly become secondary. Biodiversity becomes simplified. Water

becomes infrastructure. Nature becomes something engineered and optimised rather than nurtured and protected."

A warm wind moved through the dry channel in front of them.

"In Pania, they sacrificed ecosystems to maximise food production," Leo said. "Here, they sacrificed ecosystems to maximise climate efficiency."

He paused as a maintenance drone buzzed ahead, crossing the fence and disappearing into the forest. "And as much as these systems try to control and correct everything," he added, "nature never fully fits into that design. It reacts, shifts, adapts in ways that can't always be predicted or contained. The more you rely on constant intervention, the more you build a system that depends on that constant management."

Aisha glanced at him, her gaze still fixed on the dry channel below. "How do you know all of this?" she asked quietly. "Not just the city – but how everything connects like that."

Leo hesitated for a moment, as if deciding how far back the answer needed to go. "I worked with Dr. Voss during the youth climate programme," he said. "I learned a lot about the city while I was here." He paused. "After that, I started comparing it with other places, like Arboris, and Pania.

In Nephra, just like in Pania, one part of the system becomes the priority, and everything else gets adjusted to serve it. It works for a while, but only by shifting pressure onto something else... like water, biodiversity, or our health."

Aisha thought about the silent forests and the lifeless canal water. About how carefully controlled everything felt.

She hadn't really missed Arboris, until now.

The city of Nephra was inspired by the IPBES Nexus Assessment "Climate-first" scenario:

- Climate stability is prioritised above other nexus goals, often achieved through technological solutions and large-scale system management focused on reducing greenhouse gas emissions.
- This creates trade-offs across biodiversity, food, and water systems, as land and resources are redirected toward climate mitigation, leading to ecosystem

simplification, reduced biodiversity, and increased pressure on agricultural and aquatic systems.

- Without integrated governance across sectors, Climate First pathways increase system fragility, as environmental pressures are redistributed rather than reduced, making food and ecosystem systems more dependent on continuous intervention and less resilient to shocks.

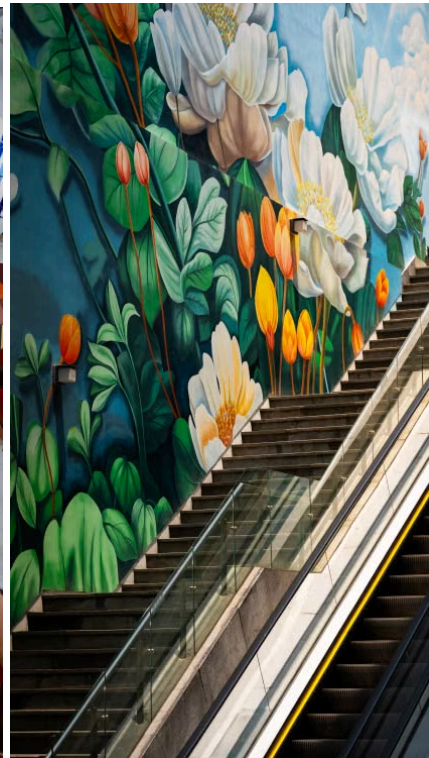
Chapter 3: Verdana – A Roof with No Walls



As the train approached Verdana Central Station, Aisha pressed her forehead against the cool glass. The train was passing over a bridge, giving her a breathtaking view of the forest below.

"Welcome to Verdana", Leo said, putting his bag on his shoulder as they stepped off the train. "The city that saved its forests!"

Aisha could tell that Leo was eager to return to Verdana. During the youth climate programme, Arboris had taken part in a pen pal exchange with Verdana, to give children an understanding of how things work in other cities. Leo had also spent a week in Verdana, living with the family of his pen pal, Danny. Now he was returning to Verdana, he couldn't wait to catch up with Danny and hear all about his life here.



To Aisha's delight, the walls in Verdana Central Station were lined with beautiful murals. She looked up in awe at the images of rare birds nesting in lush forests, rivers running clear through floodplains, and children laughing together as they planted trees.

Aisha read a sign located under one of the murals. It read, "thirty years of work".

She kept reading. The sign explained Verdana's journey, how it had let nature back into the city. Recognising the importance of restoring and conserving biodiversity, Verdana had expanded its protected areas: first the hills, then the river corridors, and in the last five years, vast stretches of agricultural land were converted back to wilderness.

In one mural, a farmer shook hands with a government official in front of a newly planted tree. Both figures had beaming smiles.

"They look really happy!" Aisha laughed.

To her surprise, Leo grimaced instead of answering.

They decided to head towards the market. As they reached the exit of the station, a tour group caught Aisha's attention. Their guide, a cheerful woman with a green lanyard, stood beside a map. She spoke loudly as she pointed to some shaded areas on the map.



"72% of the land surrounding Verdana is now under strict protection", she announced proudly. "No intensive farming, no deforestation, no human disturbance. And thanks to this, nature is thriving!"

They continued, and soon reached the market. Aisha closed her eyes, expecting to be overwhelmed by the delicious aromas of fruits, vegetables, spices, and street food, like in Pania.

"That's strange. I can't smell anything", she said, disappointed.

Opening her eyes, she realised that the market stalls were half-empty. A woman behind a table of small, bruised vegetables called out in a tired voice.

"Wait". Aisha stopped walking, shocked. "Where's all the food?"

Leo exhaled slowly.

"A lot of the farmland is now protected for biodiversity. What's left is getting squeezed pretty hard. On top of that, the city decided to ban chemical fertilisers back when I was visiting Danny. I remember the day quite well. It really affected Danny's father... he was a farmer."

"But I thought banning fertilisers would be a good thing!" Aisha replied, confused.

"In some ways", Leo sighed. "The intensive farming was poisoning the water. Nitrogen runoff was getting into the rivers and lakes, causing algae blooms, choking out fish. People downstream were getting sick from contaminated water supplies." He paused. "A bit like what is starting to happen in Pania."

He looked thoughtful for a moment.

"So they decided to ban fertilisers... just like that! Then the rivers started recovering, faster than anyone expected. It was amazing... but no one really considered what the farmers were supposed to do instead. The farmers tried to continue as they had before, with less land, and without the fertilisers they had depended on. The result? Less food, and what little there was became a lot more expensive."

Suddenly, Leo stopped.

"Danny!"

He ran over to a small table near the edge of the market, piled with uneven carrots and a few bunches of leafy greens. Behind it stood a boy about Leo's age, lean and a little sunburned. He looked up as Leo approached.

"Leo?" A grin broke across his face, startled and genuine. "What are you doing here?"

They clasped hands, and pulled each other into the brief, slightly awkward hug of two people who hadn't seen each other in years and weren't sure how much had changed. "I'm so happy you're still helping your father on the market. I knew I had to come here if I wanted to find you! "

"Well where else would I be?" Danny replied playfully. He glanced at Aisha. "Who's this?"

As Aisha introduced herself, Leo looked down at the table in front of them. Something shifted in his expression, quiet and careful. "These are your father's vegetables?"



"Yeah." Danny answered, straightening slightly. "I still come down to the market to help him on weekends."

Aisha remembered the murals in the station: "Your family farmed outside the city?" she asked.

Danny nodded. "Well, used to. Before the third expansion of the protected areas. They gave us some money in return for the land. It wasn't much, but it was something. Dad managed to keep a small plot of land, just outside the fences. But then the nitrogen ban came in and everything got harder."



"Didn't the water get better though?" Leo questioned.

"It did. The river's beautiful now! I actually swim in it most days - Dad says that would have been unthinkable a few years ago. And the forest..." he paused, and something softened in his face. "I've been into the reserves. It's extraordinary there. Really! I don't want you to think I don't see that."

"What do you mean?" Aisha asked carefully, wanting to understand.

Danny turned to her. "Well, food prices are going up like crazy. And we can barely even produce enough food for ourselves anymore. You know, my sister's only 12 years old..."

He went quiet for a moment.

"There's a health clinic doing nutritional support twice a week, which helps. But it's just... it's just that the people who gave up the most to make this all happen didn't get much back."

They talked together for a while longer, until it was time for Leo and Aisha to leave. On Danny's recommendation, they were going to go and see the forests around Verdana, to see what the city had worked so hard to achieve.

"Are you sure you can't come with us, Danny?" Leo pleaded.

Danny looked sad for a moment, and glanced down at the table between them.

"I really wish I could, but I can't... I need to stay here."

After they had hugged goodbye, Danny held Leo's arm for a second.

"Come back," he said smiling. "Not just to see the forest."

"I will," Leo promised. And Aisha could tell that he meant it.

As they left the market, Aisha and Leo walked in silence for a moment. Finally, Aisha broke the silence.

"It's like you said before... they tried to solve all their problems at once, but by only focussing on one thing. It's as if they forgot to look at all the other possible paths they could have chosen."

Leo nodded. "You're right. And you're starting to understand why I wanted to show you these places. When things are difficult, or urgent, we tend to not take the time to think about other perspectives or different solutions. It's not easy..."

Later that day, Aisha and Leo travelled to the outskirts of the city, to a part of the forest that Danny told them they had to see before they left Verdana. Passing through the gate of one of Verdana's most famous forest reserves, Aisha gasped at the trees that towered above her, and which hummed full of all kinds of life.



But as they wandered together along the trail, Aisha couldn't forget about their meeting with Danny, and how he had looked when he spoke of his younger sister, and the health clinic. She thought about Danny's father, who could no longer go to the market with his son, as he spent longer, harder hours in his fields.

Verdana was beautiful, that much was true. But she didn't understand how much longer the people could go on like this. It was as if the people of Verdana had built a beautiful house - but with only a roof, and no walls.

Finally, she remarked to Leo, “we talk about living in harmony with nature. This doesn’t feel very... harmonious. Verdana feels more like a battle, forests against farmers. So where is the harmony? I know it’s possible... I saw it in Arboris!”



They wandered in the forest for hours, lost amongst the trees and waterfalls that felt like they could go on forever.

When they finally emerged from the reserve and headed back into the city, Aisha and Leo headed straight for the bus station. As they waited for the night bus to their next stop, Tessara, Aisha thought about what they’d seen in Verdana.

Despite its beauty, something about this city had unsettled her, and she found herself excited to move on.

Aisha didn’t know what to expect from Tessara. She only knew she was tired of flawed solutions that seemed perfect at first, but which ignored how interconnected everything was.

Eventually, the humming engine of the bus lulled her to sleep.

The city of Verdana was inspired by the IPBES Nexus Assessment “Conservation-first” scenario:

- *The conservation-first scenario delivers positive outcomes for biodiversity by emphasising ecosystem protection, although the overall effectiveness of these conservation measures remain limited. It also produces slightly beneficial effects on the climate.*
- *However, this focus generates unintended consequences. Food production must increase outside protected zones, shifting agricultural pressure to other areas. This can drive up food prices and heighten food insecurity, especially for vulnerable and poorer populations.*

Chapter 4: Tessara – Where Every Piece Holds



The bus reached the top of the hill at sunrise, and Aisha saw Tessara all at once. She could see houses scattered small patches of farmland, rivers weaving between neighborhoods, solar panels glinting on every rooftop. Unlike Verdana, where the wilderness was hidden behind fences, here everything seemed to blend together. Seen from above, the city of Tessara looked like a giant mosaic, or patchwork blanket.

"Well, this is certainly different!", she laughed, nudging Leo awake in the seat next to her.

"Yeah", said Leo, rubbing his eyes as he woke up. "That's sort of the point".

Leo's mentor was waiting for them at the central square in Tessara: Priya, who worked for Tessara's Nexus Office. Priya had taught Leo during his university studies, and was now helping him to prepare for his upcoming internship in Arboris.

"What even is a 'Nexus Office'?" Aisha asked, as they walked towards the square.

Leo just laughed. "You'll see!"

They found Priya leaning against the fountain at the centre of the square. She had short, dark hair, with orange reading glasses perched on top of her head.

"You came from Verdana?" she asked, smiling. "Good, that will help you understand Teressa better."

She led them towards a huge, beautiful building. A sign above the entrance read: '*Tessara: Museum of the Living City*'.



Priya guided them through the museum. As they entered the first room, Aisha saw a sign above the door: '*The Crisis Room*'. Along the walls ran a timeline of the city's near collapse. It all seemed strangely familiar.

Priya explained, "thirty years ago, Tessara was a mid-size city facing a lot of problems. Topsoil erosion, polluted rivers, massive biodiversity loss, poor health, and rising poverty - all at once."

Aisha was curious. "When did things start to change?"

"The city council reacted quickly, addressing each problem at a time."

Aisha almost interrupted her to ask, "and did it work?"

"Not really," admitted Priya. "Every time the city tried to fix one problem, it just made another problem worse".

Aisha thought about what she'd seen in Verdana, Pania, and Nephra.

They continued into the second room: '*The Conversation*'. Entering this room felt like stepping into an archive. Floor-to-ceiling shelves held binders, notebooks, and rolled maps. The little space remaining on the walls was covered in hundreds of photographs, each depicting a different meeting. Groups from all different professions, ages and backgrounds seemed to have convened to discuss something important.

Noticing Aisha's confusion, Priya pointed to a particular photo. "Here you can see the organisation named "Tessara's future," She explained.

"Farmers, ecologists, doctors, engineers, planners, business leaders, Indigenous peoples, youth, activists, and most importantly, residents from the neighbourhoods that had been bearing the worst costs. They all came together to exchange their problems and knowledge, about how it all fits together".

Priya pointed to a large diagram mounted at the centre of the room. It showed a complicated web of words and arrows, covered in sticky notes and corrections.

"With this knowledge, the group developed a plan, and they sent it to the city council. They launched a petition to build support for their proposals. Then, the organisation launched a petition. In one month, it was signed by 50,000 people. The politicians had no choice anymore - the plan was put to a referendum, and... we won!"

"We?! You were part of this?" asked Aisha, her eyes wide open.



"Yes!" she answered proudly. "And I'm so glad you're here to learn about how it all happened, and to see for yourself how important it is to be surrounded by people who bring different perspectives to the table".

"And when it came to implementing the plan... how did you convince people to keep trusting the process?" Leo asked.

"Small wins," Priya said. "The first clean stretch of river. The first neighbourhood where child asthma rates dropped measurably. We documented everything, and we showed it, and we made sure the people who had sacrificed the most were the first ones to see the results."

She led them into the final room: '*The Nexus*'. It was circular, with curved walls covered in an enormous illustrated map of the region. Priya smiled and led Aisha and Leo to the section showing the food system.

"Agroforestry is a farming system that integrates trees into farmland," Aisha read. "It produces less per hectare than intensive monoculture, but it improves soil health, supports pollinators, and uses water more efficiently. These benefits make farms more resilient to climate variations, which helps farmers earn more stable incomes."

Priya continued reading, "when people have better food access, the health system is under less pressure."

Leo finished, "And when the children are healthier, they stay in school longer," Leo picked up.

Priya turned to look at them both. "I want to be honest," she said. "Our biodiversity gains are real, but modest. We've rewilded about 42% of the land around Tessara. Some species that would have recovered under a full conservation model are still struggling here, because the landscape is more fragmented, more human. Our carbon targets are ambitious but not maximum, we simply cannot close all factories quickly and leave hundreds of people without a job.



"And we still have work to do, mainly to encourage people to change their lifestyles. Consumption is a thorny issue, as it directly affects people's daily lives, but it's also a huge source of inequality. We're also currently designing a fair and just redistribution system, to support people with financial difficulties or those who are struggling most during the city's transition."

They stepped back out into the afternoon, the museum gardens offering a refreshing burst of green. Aisha stood on the steps for a moment, looking out at the city. She couldn't wait to explore, and see for herself what Tessara had achieved.

After a full day of exploring, they returned to Priya's home, ready for a night of rest. As the light faded over Tessara's mosaic of rooftops and riversides, Aisha realised that her journey with Leo was coming to its end. Leo's internship was starting soon, and he needed to return to Arboris.

"Your family gave me a home when I had none", Aisha told him. "But you didn't just give me a home, you gave me back my curiosity and my energy. One day, I want you to come and see Kalaysis. I want to show you what it looks like when I stop being afraid of it."

He smiled with wet eyes. "I will, I promise." And she believed him.

The city of Tessara was inspired by the IPBES Nexus Assessment "Balanced" scenario:

- *The balanced nexus scenario represents a pathway toward a broad form of sustainability. Positive outcomes include:*
 - *Consistently broad positive effects across all nexus elements (biodiversity, water, food, human health, and climate)*
 - *Restoration and sustainable management of natural resources, supported by environmentally responsible agricultural practices*
 - *Shifts toward sustainable lifestyles and consumption patterns, echoing the changes envisioned in the nature-oriented nexus archetype*
 - *Reduced greenhouse gas emissions (GHGs), contributing to climate mitigation.*
- *The balanced nexus scenario shows stronger positive outcomes for food systems and human health, and it features more robust environmental regulation than the nature-oriented scenario. It relies less on technological solutions. It encourages sustainable lifestyle and consumption shifts, similar to those in the nature-oriented nexus.*

Conclusion

On the morning of her journey back to Kalaysis, Aisha woke up early and struggled to get back to sleep. This was the first time she would embark on a journey alone. She always had her parents on her side, and then Leo, but now, she was all by herself.

Trying to distract herself, she reached into her bag for her book. To her surprise, she found a letter in her bag, one she didn't recognise. It was from Leo.



Hi Aisha,

After our trip together, I've been reflecting on what needs to change to make the world more sustainable - not just Arboris. We've achieved so much in Arboris already, so I know it is possible, but it's still an enormous responsibility.

Aisha, don't be discouraged if in the first few years, progress is slow. Like Priya said, look for the small wins and share these, and bring everyone with you.

I am sure you will meet amazing people on your journey, and I am rooting for you. I'm so sorry I can't travel to Kalaysis with you yet. But I can't wait to meet you there someday.

Don't forget to write!

Lots of love,

Leo

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Chapter 3: Verdana - A Roof with No Walls

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Chapter 4: Tessara - Where Every Piece Holds

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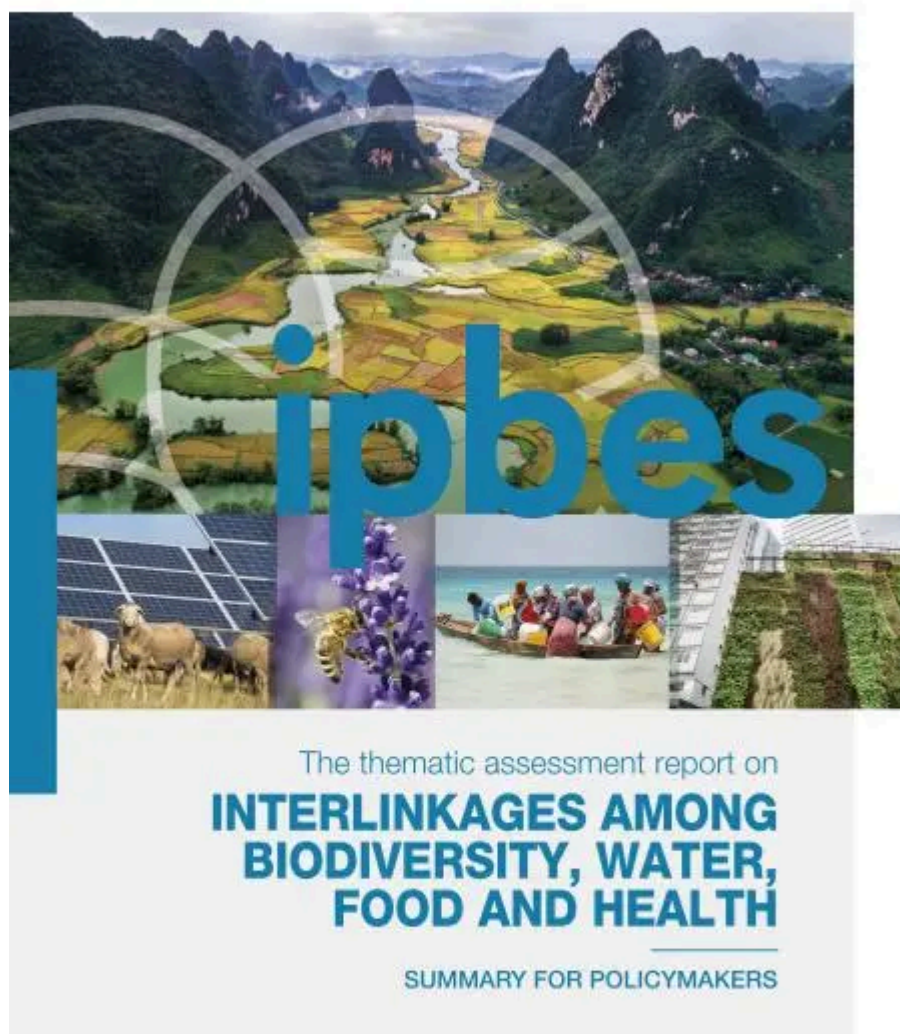
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What is IPBES ?

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) is an independent body that brings together scientists, governments, and Indigenous and local knowledge holders to assess the state of nature worldwide. Think of it as the “IPCC for biodiversity”: it synthesizes the best available evidence on biodiversity loss, its drivers, and possible solutions, and it helps governments design better policies. Its importance lies in its ability to translate complex ecological science into actionable guidance, highlight global trends, and build a shared understanding of why protecting nature is essential for human well-being.



The 2024 IPBES Nexus Assessment highlights how biodiversity, water, food, health, and climate are deeply interconnected. Together, these five elements form a “nexus”, a web of biophysical, social, economic and institutional connections through which actions in one domain (e.g., food production) directly influence outcomes in others (e.g., water quality, biodiversity status, human health). Due to these connections, the Assessment argues that addressing any single one of these elements in isolation will not be successful.

The Assessment is based on 186 scenarios drawn from 52 separate studies which each examined the interactions between the five parts of the nexus. The scenarios were grouped into six distinct categories, which reflect recurring patterns in the kinds of beneficial or harmful outcomes they produce.

The Assessment highlights how biodiversity loss, water insecurity, food system pressures, and rising health risks all reinforce one another, but that they can also generate powerful co-benefits when tackled together. Ultimately, the Assessment calls for policy approaches that are integrated, justice-oriented, and transformative, and which strengthen ecosystem resilience, reduce inequality, and promote human well-being alongside sustainable resource use.

Part A: Past and current interactions

- Biodiversity is declining, water is becoming scarce and of worse quality, impacting food security and our resilience to climate change.
- Biodiversity loss and climate change are interdependent and compound each other and primarily affect countries and populations that contributed the least to the crises.
- The fragmented governance across actors, institutions and sectors overlooks this interdependence and favors decisions made for the short-term...instead of having a long-term vision.
- Our economic system destroys nature: \$7 trillion per year are invested in activities that damage the nexus elements and worsen all the trends in biodiversity, water, health, and climate change

Part B: Future nexus interactions

- IPBES created nexus scenario archetypes, covering terrestrial, freshwater and marine environments at the local, regional, national and global scales. The scenarios were then clustered into 6 archetypes exploring the positive and negative outcomes for biodiversity, water, food, human health and climate change. The nature-oriented and balanced nexus are so-called sustainability scenarios; the conservation, climate, and food first scenarios prioritize one nexus element; and the nature exploitation scenario represents business as usual.
- Nature-oriented nexus and balanced nexus scenarios combine enhanced conservation, restoration, sustainable use, climate change mitigation. They help to reverse biodiversity loss, while simultaneously benefit water, food, human health, mitigation and adaptation. Protecting up to 30% of terrestrial, freshwater and marine areas can provide benefits across all nexus elements.
- The food first scenario can negatively impact biodiversity, water and climate change due to a higher negative impact of food systems (increase in greenhouse gas emissions, land and water use, nitrate and phosphorus pollution). This scenario leads

to unsustainable food production and consumption and is responsible for habitat degradation, loss and fragmentation. Sustainable agricultural practices, food waste reduction, novel food sources, healthy diets could cover the needs for current and future generations.

- The climate-first scenario prioritizes climate change mitigation, but could negatively impact biodiversity, food systems and water due to increased competition for land. Inclusive and integration planning of mitigation and adaptation measures can benefit other nexus elements.
- A timely implementation of responses increases the positive outcomes for biodiversity, food, water, human health and climate change. Delaying action will increase costs over time, likely to \$500 billion per year.

Part C: Response options that address nexus interactions

Response options are actions or policies that can help advance governance and sustainable management of nexus elements. They are clustered into 10 categories.

- 1) Nature-based solutions are “actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services, resilience and biodiversity benefits” (United Nations Environment Assembly resolution 5/5, 2022). Some examples are: area-based conservation, the creation of marine areas, of natural reserves, national parks in all ecosystems, ensuring their effective co-design and management.
- 2) The restoration of natural ecosystems complements nature-based solutions and contributes to water and food security, health, biodiversity protection and mitigation of climate change. Some examples include: mangrove restoration (enhancing carbon sequestration), soil restoration, water regulation, protection of endangered species and culturally important areas and practices. Restoration should be coordinated across actors and areas.
- 3) Managing human-exploited ecosystems to conserve biodiversity can safeguard the long-term delivery of nature’s contribution to people. Some examples include shifting to agroecology, ecological intensification of croplands, sustainable intensification, sustainable intensification for land sparing, forest-based practices, urban nature-based solutions.

- 4) Shifting to sustainable consumption patterns reduces pressures on biodiversity, water, food systems, health and contributes to climate change mitigation. Some examples include shifting to sustainable healthy diets, reducing food waste and greenhouse gas emissions, transitioning to renewable energy, pushing for behavioural change.
- 5) Pollution degrades biodiversity, water quality and affects human health. Regulations, incentives, a reduced use of fertilizers and pesticides, a better waste management system can contribute to reduce pollution of all kinds, including plastic, as well as the number of premature deaths (90% are due to pollution).
- 6) To address the complex challenges ahead of us, integrated approaches from planning to governance are the most effective. They produce benefits to all nexus elements and enable synergies. For example, a protected marine area improves water quality, strengthens mangroves, protects biodiversity, enhances the resilience of food systems and local communities.
- 7) Risk management is essential to reduce climate and health risks for people and ecosystems. Efficient direct responses include nature-based and ecosystem-based approaches, especially in urban areas. The One Health approach is a perfect example of the integration of biodiversity, food system management with local health services to reduce risks from diseases spillover from wildlife to humans.
- 8) Guaranteeing rights, equity, justice and gender equality deliver positive outcomes for people and nature, especially regarding rights to water, food, health, land, and environment. Some examples involve actions addressing the gendered burdens of water collection with inclusive water management; just and gender-inclusive food tenure systems with agroecological practices etc...
- 9) Additional financing tools can support biodiversity goals, but most still face barriers in implementation, accessibility and scale. Promising solutions include payments for ecosystem services, microfinance, water pricing, natural capital accounting, technology transfer and global cooperation. It is urgent to phase out subsidies damaging nexus elements to enable the shift to sustainability scenarios.
- 10) Implementing different solutions together or in a planned sequence works better than using them one by one, because they can strengthen each other and create bigger benefits across climate, biodiversity and development. When actions are coordinated, like combining ecosystem restoration with sustainable farming, or pairing clean-energy projects with water-saving measures, they save money and are more likely to succeed. But they require good governance, cooperation, funding, and urgent action.

Part D: Governing the nexus

- Governance needs to move away from isolated sectoral decisions toward more integrated, inclusive, equitable and adaptive systems that can jointly manage the drivers linking biodiversity, water, food, health and climate.
- The global biodiversity finance gap remains enormous (USD 0.3–1 trillion per year), making fiscal reforms and regulatory shifts essential to redirect harmful incentives and expand sustainable funding.
- Transforming economic and financial systems requires strengthening the capacity of decision-makers to understand ecological–economic interdependencies and to apply sustainable finance tools and economic instruments.
- Effective nexus governance depends on collaborative, cross-scale processes that bring actors together to co-create visions, assess synergies and trade-offs, negotiate implementation, and scale solutions, while embedding equity, justice, accountability and adaptive learning.
- Key words and processes to remember:
 - Scaling up: institutionalizing at the policy, rules and laws level
 - Scaling out: applying response and solutions to new places
 - Scaling down: adapt the solutions and response to the local places
 - Scaling deep: change our relationships between humans, with nature and biodiversity, undo unjust worlds, mindsets and beliefs.

Source: IPBES (2024). Summary for Policymakers of the Thematic Assessment Report on the Interlinkages among Biodiversity, Water, Food and Health of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. McElwee, P. D., Harrison, P. A., van Huysen, T. L., Alonso Roldán, V., Barrios, E., Dasgupta, P., DeClerck, F., Harmáčková, Z. V., Hayman, D. T. S., Herrero, M., Kumar, R., Ley, D., Mangalagiu, D., McFarlane, R. A., Paukert, C., Pengue, W. A., Prist, P. R., Ricketts, T. H., Rounsevell, M. D. A., Saito, O., Selomane, O., Seppelt, R., Singh, P. K., Sitas, N., Smith, P., Vause, J., Molua, E. L., Zambrana-Torrel, C., and Obura, D. (eds.). IPBES secretariat, Bonn, Germany. DOI: <https://doi.org/10.5281/zenodo.13850289>