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NBRC 2024 SCIENCE TEAM REPORT

June 12th, 2024

Contents

INTRODUCTION

Nature is boundless and rarely has rigid lines of division. Instead, it unfolds in a slow gradient, transitioning from one ecosystem to another, thus creating nice harmony without hard edges and boundaries. NBRC's 2024 topic **"Ecotones"** – the meeting and transition points between ecosystems or cultures. The word itself draws its roots from the ancient Greek words *οἶκος* for house and *τόνος* for tension. These ecological crossroads are not only hotspots for biodiversity, but also epicentres of challenges. From wetlands and estuaries to the dynamic riverbanks and lake shores, all these ecotones share a common trait – they are both hosts to a multitude of species and show sensitivity to the pressures of climate change, urbanization, and expanding agriculture. With this topic, we asked the following questions - how can we find ways to preserve and respect these meeting areas? Can we find ways to incorporate this concept not only in ecology, but also spatial planning, urban and cultural geography?

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SCIENTIFIC LECTURE: ECOTONES – THE SHELTER FOR RICH BIODIVERSITY

Introduction

The North & Baltic region congress opening ceremony was initiated by Kęstutis Katilius from the State Service of Protected Areas, delivering a scientific lecture titled "Ecotones – The Shelter for Rich Biodiversity." Katilius, a senior specialist, focuses on the conservation objectives within Natura2000 sites and the monitoring of EU-important habitats and plant species listed in Annex II of the Habitats Directive. The lecture highlighted the significance of ecotones in fostering biodiversity, emphasizing Lithuania's unique geographical position and its rich plant diversity.

Methodology

Katilius began by defining ecotones as transitional areas where two natural habitats meet and blend. These areas can vary in width and are significant for biodiversity due to the convergence of species from different ecological regions. He outlined two main types of ecotones based on spatial scale:

- Biogeographical Ecotones: These occur between ecoregions and are defined by macroclimate. They are zones where distinct ecological regions converge, supporting species from both regions and unique adaptations to transitional conditions.
- Ecosystem Ecotones: These are transitional zones between distinct ecological communities, influenced by various local factors such as soil type, water availability, and microclimate.

Focusing on biogeographical ecotones, Katilius explained their significance in Lithuania, where the boreal and continental (temperate) biogeographical regions meet. He introduced the concepts of zonal and azonal vegetation:

- Zonal Vegetation: Dominant vegetation types determined by climatic factors, such as boreal spruce forests in Northwestern Lithuania and temperate oak-hornbeam forests in Southwestern Lithuania.
- Azonal Vegetation: Plant communities influenced by local conditions, such as raised bogs in the Žuvintas Biosphere Reserve and sand dunes in the Curonian Spit.

Katilius noted that Lithuania's flora includes species from both boreal and temperate regions, with significant overlaps and transitional zones, particularly in the hemiboreal region. This region features a mix of boreal spruce forests and temperate broadleaved forests, with species distributions gradually blending rather than sharply dividing.

Lithuania's flora is diverse, with 33% of its vascular flora species belonging to the temperate-submeridional group and 17% to the temperate group. Despite the abundance of these species, many are rare, while the boreotemperate group, comprising 22% of native species, includes a higher proportion of common species. This diversity highlights Lithuania's transitional ecotonal character, hosting species from distinct regional pools.

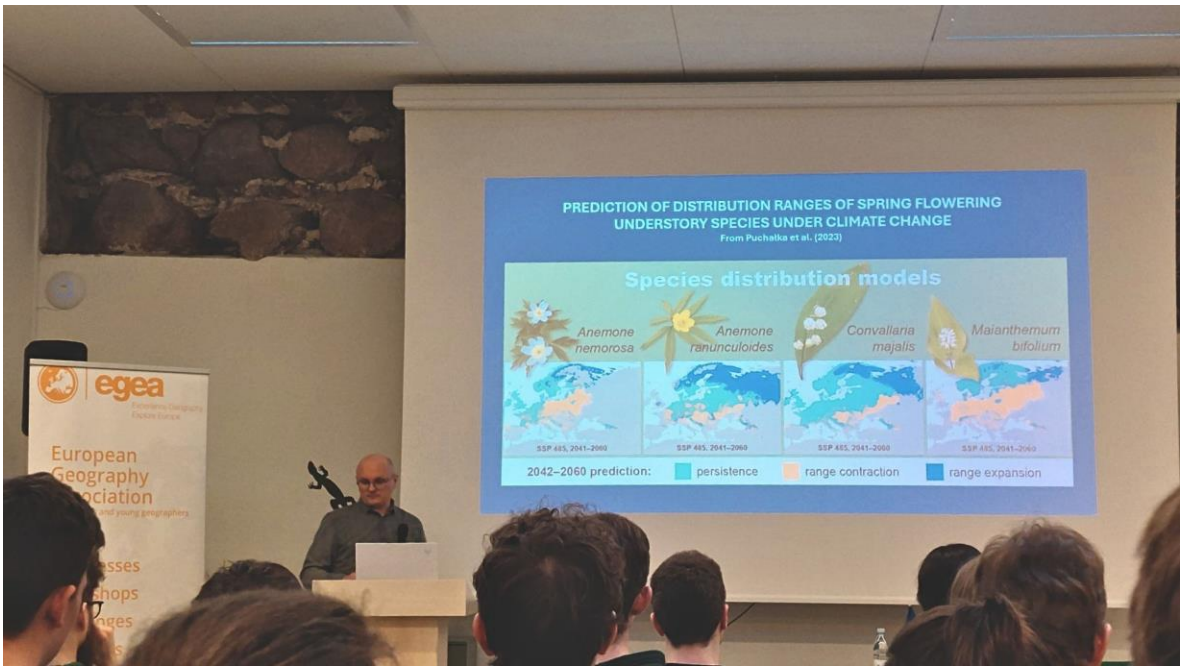
Addressing the impact of climate change, Katilius discussed the potential contraction of Norway spruce distribution due to rising temperatures and the spread of the European bark beetle. This beetle poses a significant threat to spruce forests, with climate change exacerbating its spread. Projections indicate that spruce stands in the hemiboreal region will become increasingly susceptible to bark beetle infestations, leading to shifts in species distribution.

As Norway spruce retreats northwards, its ecological niche may be occupied by native broadleaved trees such as maple, lime, and ash in rich soils, and pine in poorer soils. This adaptability is attributed to the ecotonal characteristics of the hemiboreal region.

Katilius also highlighted the challenges faced by specialist spring-flowering understory plants like anemones and lilies, which are highly sensitive to climate change. These species may experience habitat loss and struggle to migrate quickly enough to adapt, potentially leading to reduced biodiversity and altered forest ecosystems.

Results

In conclusion, Katilius emphasized that biogeographical ecotones, such as those in Lithuania, are crucial for supporting rich biodiversity. While these transitional areas may offer some resilience to climate change, they still face significant threats. The lecture underscored the importance of understanding and conserving ecotones to protect biodiversity in the face of changing environmental conditions.



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WORKSHOPS

Weather forecast

Workshop leader: Miroslav Hakl EGEA Praha

Introduction

The topic of the workshop is weather forecasting. Main goal of the workshop is to teach participants how to work with data and learn where to get weather data and how to interpret it correctly. We will also try to collect weather data on the spot and make our own forecast. I have experience with this topic because I used to work for the Czech hydrometeorological institute (Český hydrometeorologický stave) as weather forecaster.

Methodology

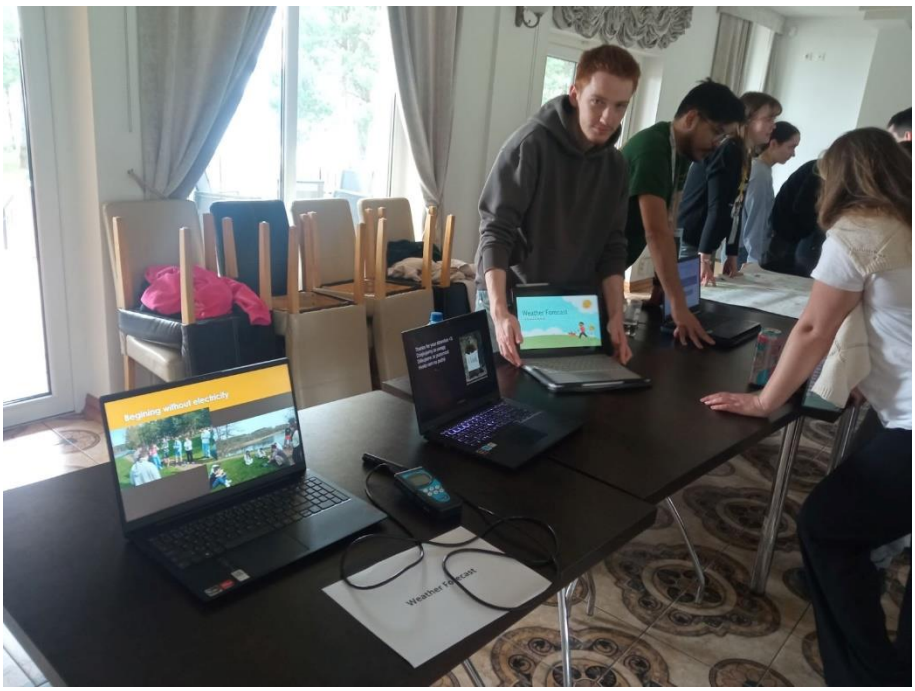
In the first session we made some ice breaking games where participants can get to know each other better. After that I showed the weather measurement instruments and we also got some data. In the rest of the first part of the workshop I present some theoretical thoughts about weather forecasts and show participants where to get data for their forecast and how to use models and other sources of data. In the second part I split

participants into three groups and participants tried to make their own forecast for congress location until the end of the event and one group also had time for making forecast for their hometown. For the local forecast we used mainly websites of the Lithuanian weather service (https://www.meteo.lt/en/).

Results & Interpretation

Results of our workshop were three presentations containing weather forecast for congress location, in one case for Marburg in Germany (hometown) and in two cases also some memes about weather or our workshop to make it more attractive at workshop presentation tables. Despite technical problems (electricity was not working in the first part of the workshop), we managed to teach the participants at least a little bit where to look for and how to work with relevant weather information, which can be practical for everyday life, especially on the road and for geographers also in the field.

I expected that we could get more into detail and also try to make forecast for our home location, but also due to a blackout during the first session and only two sessions of the workshop were not time for that.



Healing with nature: the concept of therapeutic forests

Workshop leader: Lukas Bevanda, EGEA Vienna

Motivation

In modern society, people are increasingly exposed to overstimulation and pressure to perform, which leads to persistent stress. At the same time, most people lack the resources to deal with this stress. This results in excessive demands, isolation and serious mental illnesses such as anxiety, depression and burn out. Therefore, my motivation is to counteract this trend with methods that balance these burdens and support participants in living a healthy and sustainable life.

The first goal of the workshop is for participants to understand the basic function of our nervous system and the neural organization of stress in the brain. They then practice the Japanese art of forest bathing or "Shinrin Yoku," which helps them regulate their nervous system and thus their stress levels.

My experience in this area comes primarily from my own journey through stress, overwhelm and recovery. Since I'm diagnosed with ADHD, I tend to get overstimulated easily. When faced with additional stress in life, I always found it relatively difficult to regulate myself. Therefore, in recent years I have gained a lot of experience in the areas of mindfulness, body awareness and the regulation of the nervous system. This happened in therapy, in groups or in special training. Now seeing that many people, ADHD or not, have similar difficulties, I want to pass on my knowledge.

Methodology

The workshop was structured in such a way that the theoretical basis for the later exercises was laid in the first part (morning). Here we looked at the basic functionality, effects and consequences of stress. This also includes knowledge about the human nervous system, certain body functions and neurotransmitters. The basis for this is models from the psychotherapist Dr. Gert Kaluza (Kaluza, 2018). In addition, I was supported by a prospective psychotherapist and head of the mental health group "My Studies in Balance" at the "ÖH" in Vienna (ÖH, 2024).

We also looked at the concept of a therapeutic forest using the Heringsdorf Healing Forest as an example. But first, the participants used the previously acquired knowledge to draw their own perfect therapeutic forest, which was then compared with the actual one in Heringsdorf. Here are their versions:

Figure 2: Therapeutic Forest Drawing Group 1

Figure 2: Therapeutic Forest Drawing Group 2

And here the example from Heringsdorf:

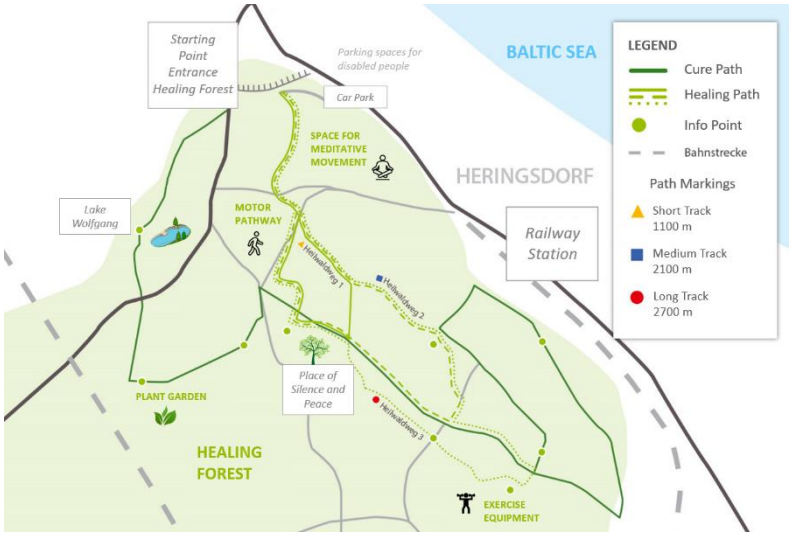


Figure 3: Therapeutic Forest Heringsdorf (Heilwald Heringsdorf, 2024)

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In the second part (afternoon) we went into the forest to feel the healing and calming effects of nature first hand. I taught exercises that promote mindfulness, open the senses, calm the nervous system and therefore have a great positive effect on our mental and physical health and well-being. The methods for this come from the psychologist and forest bathing trainer Martin Kiem from South Tyrol (BR, 2020).

Figure 5: Forest Bathing 1

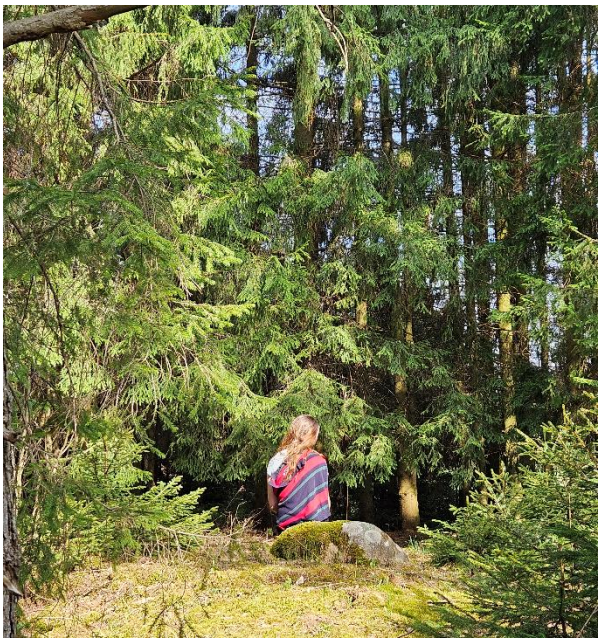

Figure 4: Forest Bathing 2

Results & Interpretation

The results and feedback from the workshop largely corresponded to my expectations and previous experiences. During the exercises, the participants were able to build a mindful connection to the forest, increase awareness of their surroundings and inner processes and improve their general mood.

The positive feedback, together with the fact that the topics were completely new to most participants, confirms that this field is a blind spot in our society. This motivates me to learn even more about body awareness and regulation and to continue teaching these skills and knowledge.

Literature

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Lake depth measuring: introduction to bathymetry

Workshop leader: Dr. Laurynas Jukna, Vilnius University

Introduction

Lake depth measurements are essential for understanding the ecology of lakes: temperature gradients, light availability and oxygen levels all depend on the lake depth and influence the distribution of various species by creating distinct habitats within lake. This workshop, led by Dr. Laurynas Jukna from Vilnius University provided insight about the bathymetry of the Lake Virintai next to the congress accommodation.

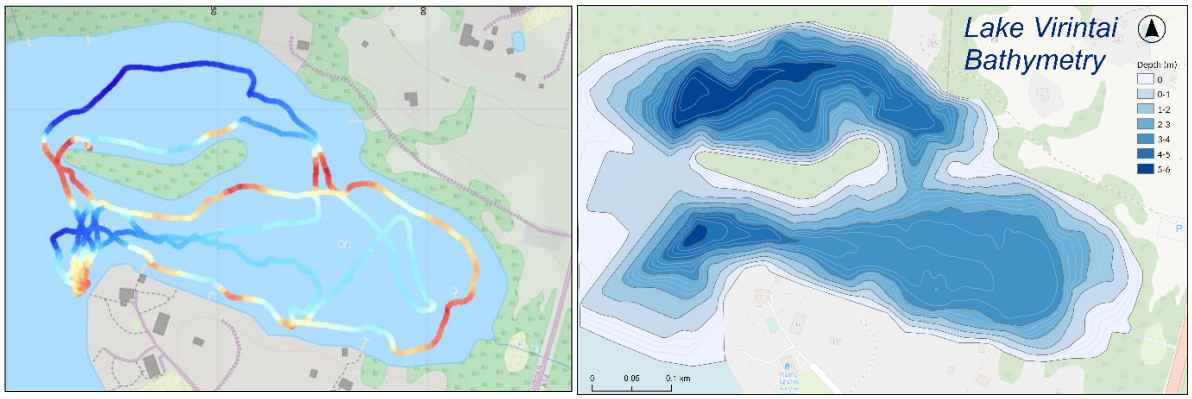
Methodology

The workshop was started by Dr. Laurynas Jukna explaining the principles of measuring lake depth, followed by actual measurements with HELIX 9 SI GPS sonar. The measurements were conducted in pairs and because of the timeframe only a small area of lake was measured. Workshop participants gathered the data and visualized it with

ReefMaster software specialising in bathymetric data analysis. Sonar measurement points were interpolated, and lake depth isobaths were exported to QGIS for further visualization.

Results

Final results were presented by participants in a form of Lake Virintai Bathymetry map. Here you can see the measuring routes and final bathymetry map of east Lake Virintai. Although the maximum depth is only around 6 meters in this part of the lake, the previous data suggest that the deepest point of the lake is more than 40 meters, with some clear variance in the whole area. Participants also presented sidescans and raw sonar data visualizations in their presentation, which were really interesting to inspect.



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EXCURSIONS

The “atomic” town Visaginas: A Lithuanian cultural ecotone

On April 11th, fourteen NBRC participants had the opportunity to visit Visaginas. Visaginas is one of the few planned towns in Lithuania, constructed specifically to serve the Ignalina Nuclear Power Plant. Since the town’s establishment in the 1970s, many foreigners have settled there, creating a majority-minority environment in Visaginas. These unique characteristics make Visaginas a perfect example of an ecotone—a distinctive area nestled between different cultural and social crossroads.

The excursion began at the Ignalina Nuclear Power Plant. Participants had the full power plant experience, with one person even mentioning that it was one of the best experiences of their life! At the power plant, we went through a security check, donned special clothing, and started our journey with the amazing tour guide, Beata. We visited every nook and cranny of the power plant, including the main areas. We observed the power plant’s control panel, dismantling material storage, and even stood next to the nuclear reactor. This detailed tour enabled us to understand the complexity of nuclear decommissioning, which will take hundreds of years.

Later, we toured Visaginas with Oksana from Urban Stories Visaginas. This short but intensive tour helped us better appreciate the extraordinary urban fabric of Visaginas, shaped by modernist planning, ethnic diversity, and beautiful nature.

We would like to express our sincere gratitude to Vilnius University for arranging the bus for the excursion. Additionally, we are very thankful for the complimentary tours provided by the Ignalina Nuclear Power Plant and Urban Stories Visaginas.

Extreme hike

Ecotones – the topic of our congress, made the best opportunity for a hike to experience them ourselves. The hike happened in the swampiest region of Lithuania – Labanoras Regional Park, making the hike extremely hard. The path selected for this hike did not make it any easier but challenged us to drop the paths and get our feet wet, since the ecotones are best visible, where no humans come across. But wading through the swamps made the hike even more fun, being the first and hopefully not last experience for the participants. The beauty of the hike did not disappoint anyone either, we have seen different kinds of animals and as for the words of participants: “the landscape and the flora changing every 100 meters”.

The hike started in a small town called Labanoras and went on in the only direction with no paths. The total length was 18km, but the hike lasted for the whole day, since the speed of us going through swamps was 2km/h, in some places even being only 1km/h. The hike ended in a village called Stirniai, from which we were picked up by a bus and drove back to the venue.

The hike definitely defied all expectations, since none of the participants could even imagine beforehand, what extreme could there be in Lithuania, there are no mountains here! Quickly enough everyone learned what the swamps actually looked like and fell in love with them.

Although the hike wasn’t perfect, we’ve learned that although you want to show the participants as much as possible, it’s a must to have more time to rest, since at the end of the hike, most of the participants were super tired where it caused to lose some interest in the surroundings.

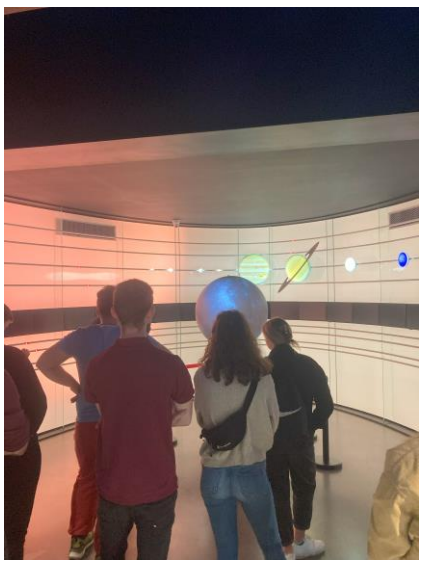
Here’s a few photos of the excursion:

The Lithuanian museum of Etnocosmology - a place between the earth and the sky

Heading eastward from our venue, one would stumble upon a special spot: Kulionys village, the main place for scientific and amateur astronomical observations in Lithuania. The village hosts the Lithuanian museum of Ethnocosmology - the only museum of this kind in the world.

The excursion to Etnocosmology museum started with a short hike to the exhibition center. There the participants had an eye-opening excursion with one of the museums employees, who went through the history of space exploration and astronomy. From one venue to another, participants could hear about traditional Lithuanian practices and early thoughts about space, the most important discoveries about universe and fundamental nature principles and astronomical research done in place with one of the largest telescopes in Northern Europe. After the excursion participants climbed to the observation tower, situated at the height of 32 meters. From this glass deck, they could observe as much as six lakes of the Highlands and Labanoras Forest.

After the guided tour, participants had a short hike around the surrounding area with the revered Kulionys mound and beautiful forests of Labanoras Regional Park.



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