

**NATURE RESEARCH CENTRE,
Institution code 302470603**

STRATEGIC ACTIVITY PLAN FOR 2023-2025

MISSION

The NRC is an internationally competitive higher education and research institution conducting fundamental and applied research on living and non-living nature, which helps ensuring the quality and continuity of the life of society in conditions of diverse changes in ecosystems and emerging social challenges.

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VALUES

Activity of the Centre is performed by the community, whose value priorities are based on the principles of human communication, mutual respect and trust, diversity of opinions and continuous improvement, responsibility to present and future generations.

I. STRATEGY OBJECTIVE

The Strategy Objectives of the Nature Research Centre (further – Centre) consists of the performing the international-level scientific research and experimental development (further - R&D) in the field of natural sciences and training of the highly qualified scientists including the doctor students and post-doc fellows.

In pursuit of the strategic objective, the Centre conducts research in three main directions provided for in the resolution no. 1800 of the Government of the Republic of Lithuania of 23 December 2009.

- 1) Research, development of theoretical foundations and forecasting of the environmental quality, state of natural ecosystems and habitats, species, community and population structure, regularities and mechanisms of their functioning, sensitivity, and vulnerability, genetic diversity, adaptations, and microevolution under conditions of global change and anthropogenic impact,
- 2) Research and forecasting of the state and changes in Lithuanian nature and biological resources, scientific substantiation of their preservation, restoration and sustainable use.
- 3) Research into the structure, properties, formation of the earth's depths and surface, evolution of palaeogeographical and palaeoecological conditions, the state, change and interaction with anthropogenic activities of underground and surface water systems, landscape and geoenvironment, scientific substantiation of the sustainable use of depth and surface resources on the territory of Lithuania.

The growing need for research in ecology, geology, physical geography, botany and zoology in our country as well as the implementation of EU-wide activities calls for highly qualified research potential. To meet this need, the Centre actively works together with Lithuanian and foreign study centres, carrying out activities of the third degree (doctorate) and post-doctoral internship projects.

In order to carry out high-level research competitive in the world of science, to develop international relations, and to acquire modern equipment, the Centre needs additional funding, which can be obtained by performing scientific applied and experimental development works. When conducting fundamental and experimental scientific research activities, emphasis is placed on the applicability of the obtained results to the modernization of the national economy, improvement of the living conditions of society and sustainable development.

II. PRIORITIES OF THE CENTRE'S ACTIVITY

Capitalization of scientific knowledge of the natural environment, its resources and their sustainable use and active cooperation with interested international and national management and business institutions of various levels and society constitute the essence of the Centre's activities. Global-scale climate change-induced challenges to the biodiversity and ecosystem protection and their solutions defined in international and national legal acts of various levels (European Green Deal, EU Biodiversity Strategy, European Climate Pact, Lithuanian Progress Strategy "Lithuania 2030"; etc.), require detailed and substantiated knowledge of this field, and it the Centre that collects, analyses, and communicates this knowledge to society in various forms. Creative and innovative activities, associated with accountability to the state and responsibility to society, represent the essential obligation of the research community working herein, ensuring the realization of the Centre's activity priorities.

Established in response to the developing priority trends in scientific research, R&D activities and innovations in Lithuania, Centre provides internal and external users with scientific research and experimental development services, effectively meeting the needs for ecosystem and sustainable development research and studies in the country. The R&D activities performed at the Centre are aimed not only at ensuring Lithuania's competences in assessing the state of living and non-living nature resources and their protection, but also at helping business to efficiently and sustainably use natural resources, thus increasing the added value of production and the economic benefits of activities. The R&D activities carried out at the Centre also help business to absorb new types of natural resources and waste, thus implementing the principles of circular economy, which promotes sustainability. By granting public access to its infrastructure and R&D results, the Nature Research Centre contributes to the process of public information and education. Planning and management of the activities are basically in line with the European Green Course and tasks of the new EU biodiversity strategy and are focused on implementing their goals, which are to make nature healthy again, thus helping to fight climate change and disease outbreaks.

Priority activities of the Centre are as follows: (i) international level fundamental scientific research and cross-border project activities, ensuring national and international information needs in the fields of botany, zoology, ecology, biology, geology and geography sciences, supporting the initiatives to preserve bio and geo-diversity and environmental sustainability as well as the measures to prevent climate change and negative effects of economic activity; (ii) R&D activities, i.e. applied scientific research and services, substantiating the efficient use of bioresources and the implementation of circular economy principles.

Taking into consideration the challenges posed to society and the proposed ways of overcoming them that are identified in strategic documents of the European Union and of our country, in its implementation plan of program activity initiatives, the 18th Government of the Republic of Lithuania has included projects and actions that are directly related to the protection and restoration of natural capital and assurance of its sustainable use. In response to the challenges facing today's society related to the state, survival and restoration of ecosystems, and sustainable use of natural resources, the following three long-term institutional research and experimental (social, cultural) development programs were approved as the Centre's activity priorities for 2022-2026 (Order of the Minister of Education, Science and Sports of the Republic of Lithuania No. V-585; 2022-04-19):

1. Research into the state and dynamics of biodiversity and habitats, scientific substantiation of their preservation and restoration;
2. Climate change and anthropogenic impacts on the state, functioning and services of ecosystems and sustainability of resources;
3. Spread of harmful substances, pathogens and adverse factors in a changing environment in the context of risk assessment and environmental quality improvement.

In the planned research, exclusive attention is paid to natural ecosystems and their key components, which provide society with the basis for its stable survival, i.e. the necessary resources and the emotional well-being, which actually ensure the prerequisites for long-term progress. Due to the complexity of ecosystems and their exceptional ability to respond to internal and external changes, today's challenges, posed by an immeasurably increased economic activity and obvious global climate changes, have become particularly relevant. Degradation of ecosystems due to external loads (e.g. resource depletion), increasing pollution or climate change, as well as due to the destruction of individual ecosystem components and the resultant disruption of their functions and interactions, threatens the future of our planet and its inhabitants. Both on a global and national scale, the preservation and restoration of ecosystems is an essential direction for the further development of society and a prerequisite for its survival. To prevent the collapse of ecosystems, to ensure their sustainability or to restore them and thus ensure the diversity of the services and resources they provide, it is necessary

that states and all society members should take a novel, scientific knowledge-based approach to the strategy towards preservation and sustainable use of ecosystems, to the development of which Centre's researchers will undoubtedly contribute.

Extinction (degradation) or uncontrolled expansion of individual organism species and their groups/populations taking place in the world concurrently, the growing frequency of invasions and the increasing scale of inflicted damage undoubtedly have a negative effect on people and important branches of economy. It is obvious that it is extremely important that analysis of the impacts exerted by the activity of pathogenic microorganisms, production of toxins by living organisms, spread of existing and newly created harmful chemicals in the environment and dynamics of various adverse factors be performed employing the latest research methods both at various levels of biological organization and at the level of ecosystems. It is only in this way that it is possible to reliably assess the diversity of pollution-related phenomena, their dynamics and risks to the environment and people, and to substantiate the possibilities and measures of prevention. Thus, a safe living environment can be maintained only through rational, updated scientific knowledge-based, joint efforts of countries and their citizens to reduce pollution intensity.

Wildlife biodiversity, which represents a living network of a multitude of closely related life forms co-existing in various ecosystems, and providing food, shelter and protection to humanity, is especially important. The only way to preserve the quality and continuity of human life on Earth is to preserve and restore biodiversity (EU Biodiversity Strategy 2030). The loss of biological diversity, leading to the decline of ecosystem services and inevitable economic crises, has been identified as the biggest challenge to face humanity in the coming decades. Neutralization of this challenge or at least its impact mitigation will be one of the essential activity priorities of the Centre's researchers.

Another area on which research efforts of the Centre will be focused is environmental pollution. High-quality environment is one of the essential prerequisites for the development of society as well as for the preservation of the well-being and health of citizens. Unfortunately, due to climate change, loss of natural capital and increasing anthropogenic pollution, in recent decades, the quality of environment has been deteriorating. This fact impels countries to look for effective measures to preserve the living environment so as to pass it on to future generations. For these reasons, research dealing with natural and anthropogenic pollution issues is given priority when planning the Centre's future activities.

III. APPROPRIATIONS FOR THE IMPLEMENTATION OF THE STRATEGY PLAN

Funding of the Centre's scientific research and R&D activities will come from two sources: 1) state budget funds and 2) Centre's revenue derived from R&D and other services provided. The planned state budget appropriations for the program implementation in 2023 (excluding appropriations for state investment program) are 6528,0 thousand EUR, and 6380,0 thousand EUR both in 2024 and in 2025. Alongside with this, up to 2000,0 EUR are going to be involved fulfilling the R&D programmes of both national and international level while implementing the strategy objectives of the Centre.

IV. STRUCTURE AND MANAGEMENT OF THE CENTRE

The Centre is a state scientific research institute, operating as a state budget institution and conducting long-term fundamental research according to the trends established in its Articles of Association and experimental (social, cultural) development, results of which are important for the state, society, international cooperation, and economic entities. The Centre conducts its activities complying with the Republic of Lithuania Law on Science and Studies April 30, 2009, No. XI-242 (As last amended on 8 December 2022 - No. XIV-1634), the Resolution of the Government of the Republic of Lithuania No.1800 of 23 December 2009 „On the reorganization of the Institute of Ecology of Vilnius University, the Institute of Geology and

Geography and the Institute of Botany“ (Official Gazette, No. 158-7186, 2009) and the „Schedule of Terms and Conditions of the Reorganization of the Institute of Ecology of Vilnius University, the Institute of Geology and Geography and the Institute of Botany“ approved thereby, “Articles of Association of the State Scientific Research Institute Nature Research Centre“.

Subsequently The Nature Research Centre consists of three research institutes, i.e. the Institute of Botany, the Institute of Ecology and that of Geology and Geography, with a total of 22 scientific research laboratories: Laboratory of Genetics, Laboratory of Mycology, Laboratory of Plant Physiology, Laboratory of Plant Pathology, Laboratory of Flora and Geobotany, Laboratory of Economic Botany, Laboratory of Biodeterioration Research, Laboratory of Aquatic Ecotoxicology, Laboratory of Algology and Microbial Ecology, Laboratory of Avian Ecology, Laboratory of Evolutionary Ecology of Hydrobionts, Laboratory of Mammalian Ecology, Laboratory of Molecular Ecology, Laboratory of Chemical and Behavioural Ecology, Laboratory of Entomology, Laboratory of Genotoxicology, Laboratory of Fish Ecology, P.B. Šivickis Laboratory of Parasitology, Laboratory of Bedrock Geology, Laboratory of Geoenvironmental Research, Laboratory of Quaternary Research, Laboratory of Climate and Water Research, and Laboratory of Nuclear Geophysics and Radioecology. Several structural units and research stations indispensable for Centre’s research activities operate in different parts of our country, e.g. the Coastal Biological Station and the Seashore Research Laboratory in Neringa, Field Experimental Research stations in Vilnius, Ventė, Rusnė and in Ignalina regions.

Activities of the Centre are organized and controlled by the Administration and Scientific Council, which take strategic decisions regarding the Centre and its structural units, scientific priorities, and similar strategic decisions.

V. HUMAN RESOURCES

There are 299 employees (Fig. 1) on the staff list of the Centre, of which 161 are research workers. At present, the research staff of Centre consists of 24 Chief researchers, 75 Senior researchers and 54 Researchers, and 8 Junior researchers. According to the strategic activity plan, the number of the staff is going to stay on the same level (Table 1) or even increase in case of the positive financial turns.

Table 1. Number of positions and distribution of expenditure on wages according to position groups

	2023	2024	2025
Number of positions of the NRC	299	299	299
Expenditure on wages, thousand EUR	5320	5320	5320



Fig. 1. Number of the employees and distribution of the positions at the Centre

Training of doctoral students and highly qualified researchers occupies a significant part in activities of the Centre. In cooperation with educational institutions of Lithuania and those of foreign countries, the Centre runs the following five doctoral study programmes: Ecology and Environmental Science (in collaboration with Vilnius University), Biology (in collaboration with Vytautas Magnus University), Geology (in collaboration with Vilnius University), Physical Geography (in collaboration with Vilnius University and Klaipėda University) and Zoology (in collaboration with Vilnius University).

The number of full-time students currently pursuing PhD studies at the Centre is 51, 27 of which are doing a degree in the area of ecology and environmental science, 10 in biology, 7 in geology, 4 in zoology, and 3 in physical geography.

VI. ANALYSIS OF THE SITUATION

STRENGTHS	WEAKNESSES
<p>Top-skilled scientific staff Highest-level international recognition in different fields of scientific research Interdisciplinary character of fundamental and applied research Well-developed experimental infrastructure Depending on existing possibilities – provision of incentives for researchers, favourable and motivating work environment, and support for the development of an early career researchers' network</p>	<p>Predominance of middle-aged researchers and limited possibilities to attract young researchers Insufficient upgrading of scientific research infrastructure Insufficient competence to communicate with business Insufficient dissemination of Centre's activity on an international level</p>
OPPORTUNITIES	THREATS
<p>Global priority of protection and restoration of biodiversity Globally recognised demand to ensure the scientific justification of sustainable use of natural environment A wide spectrum of global-level fundamental and applied research A unique competence on a national and, in separate research areas, on a regional and global scale Good possibilities for the development of international third-cycle studies and postdoctoral fellowships</p>	<p>Reserved attitude of society towards the necessity of scientific research and researcher career prospects Nationally and globally evident decrease in the possibilities by public and private sectors to support fundamental science Legislation restricting the speed of activities and the freedom of choice in the area of public procurements Impediments to the development of global competitiveness due to the problems of upgrading of intellectual and technical potential</p>

VII. IMPLEMENTATION OF THE STRATEGY ACTIVITY PLAN

Programming

For the implementation of the strategic goal of the Strategy activity plan one programme – *Development of national science and scientific research and experimental development in the area of natural sciences* – was designed (Table 2), describing the distribution of appropriations for 2023-2025 interval (Tables 3-4), indicating the particular assessment criteria (Tables 5-6), programme goals, tasks assessment criteria and their values.

The purpose of the programme (Table 7) of the Centre's strategic action plan is being implemented by attaining the highest results in the areas of scientific research and experimental development and breakthrough innovations related to the cognition, preservation, restoration, and rational use of living and non-living nature. Following the EU and national strategic planning documents and considering public development prospects, the Centre's researchers pursue investigations of the regularities and mechanisms of climate dynamics, the state of environmental quality, and evolution of current and ancient ecosystems under global change and anthropogenic impact conditions, create their theoretical background and make prognoses of possible changes, develop ecosystem management strategies, and model scenarios of their possible changes. New challenges force people to join researchers and together gain new competences related to the development and nature of changes occurring in ecosystems, disclosure of their reasons and forecasting consequences. The global breakthrough in the most urgent fields of natural sciences is necessary seeking to ensure safe living conditions and the basis of renewable raw materials which are essential in creating social welfare.

Table 2. Centre activity plan project 2023-2025

Code of measure	Name of measure	Name of the institution's action	Process and/or contribution assessment criteria, measurement units and values	Responsible executors	Deadline for execution	Appropriations (thousands of EUR)
DEVELOPMENT OF THE NATIONAL SCIENCE AND EXPERIMENTAL RESEARCH IN THE FIELD OF NATURAL SCIENCES IN 2023						
01	1. Investigate the condition of natural ecosystems, the depths of the earth and its surface, biological resources and ensure the experimental development of research	Conduct fundamental research, publish high-level research papers, monitor the activity of researchers	Share of research papers in international publications from all published papers (percentage)	Heads of core units and laboratories	Annually	6481
02	2. To train highly qualified researchers of natural sciences	To participate in the doctoral process, to prepare doctors of natural sciences	Number of doctoral students studying (N); share of doctoral students who have successfully defended their dissertation since graduation (percentage)	Scientific secretary, supervisors of doctoral students	Annually	562

Table 3. Distribution of appropriations for 2023-2025 (thousand EUR)

Code of goal, task, measure	Name of goal, task, measure	Projected appropriations for 2023				Projected appropriations for 2024				Projected appropriations for 2025			
		Total	of which			Total	of which			Total	of which		
			Expenses		Asset acquisition		Expenses		Asset acquisition		Expenses		Asset acquisition
			Total	Salaries			Total	Salaries			Total	Salaries	
1	2	7	8	9	10	11	12	13	14	15	16	17	18
12.001.11.	Goal: To pursue global-level scientific research and experimental development in the area of natural sciences and prepare highly skilled researchers	7043	6983	5320	60	6895	6835	5320	60	6895	6835	5320	60
12.001.11.01	Task: To pursue experimental development of scientific research in the area of natural sciences and ensure the progress of doctoral studies	7043	6983	5320	60	6895	6835	5320	60	6895	6835	5320	60
12.001.11.01.01	Measure: – To investigate the state of natural ecosystems, Earth's entrails and its surface, and biological resources and to ensure scientific research of	6481	6421	5320	60	6333	6273	5320	60	6333	6273	5320	60
12.001.11.01.02	Measure: To prepare highly skilled researchers in the area of natural sciences	562	562			562	562			562	562		
	1. Total from the state budget of the Republic of	7043	6983	5320	60	6895	6835	5320	60	6895	6835	5320	60
	Of which:	6528	6528	5150		6380	6380	5150		6380	6380	5150	
	1.1. General funding												
	1.2. EU and other international funding												
	1.3. Target funds and income	515	455	170	60	515	455	170	60	515	455	170	60
	2. Other sources (EU financial support for implementation of projects and other legally obtained funds)												
	Total programme funding (1+2)	7043	6983	5320	60	6895	6835	5320	60	6895	6835	5320	60

Table 4. Distribution of appropriations for 2023-2025 (thousand EUR)

7043 No.	Programme code and title	Appropriations planned for 2023				Appropriations planned for 2024				Appropriations planned for 2025			
		In total	Of them			In total	Of them			In total	Of them		
			For expenditure				For expenditure				For expenditure		
			Of them for wages	For property acquisition				Of them for wages	For property acquisition				Of them for wages
1.	1.1. Development of national science and experimental research in natural sciences	7043	6983	5320	60	7043	6983	5320	60	7043	6983	5320	60
In total		7043	6983	5320	60	7043	6983	5320	60	7043	6983	5320	60

Table 5. Strategic goal assessment criteria

Assessment criterion code	Effect assessment criterion name	2022	2023	2024	2025
E-01-01	1. Part (percent) of scientific articles in international scientific journals of the total number of published articles	78.0	78.0	80.0	85.0
E-01-02	2. Amount of state budget appropriation per one international scientific article (EUR)	26.7	26.7	25.4	25.2

Table 6. Programme goals, tasks, assessment criteria and their values

Assessment criterion code	Names of goals, tasks, assessment criteria and measurement units	Assessment criteria values				Related strategic planning document
		2022	2023	2024	2025	
1	2	4	5	6		7
	Goal 1. To pursue global-level scientific research and experimental development in the area of natural sciences, prepared highly skilled researchers					
R-01-01-01-01	Part (percent) of experimental development funds from state budget appropriations	30	30	30	30	
R-01-01-01-02	Number of doctoral students	51	58	60	60	
	Goal 1, task 1. To pursue experimental development in natural sciences, strengthen infrastructure and ensure the process of doctoral studies					
P-01-01-01-01-01	Number of international scientific articles	129	140	150	150	
P-01-01-01-01-02	Amount of funds earned from international projects and experimental development (thou. EUR)					

Table 7. Name of the Programme: development of national science and scientific research and experimental development in the area of natural sciences (12.001.11)

General information about the programme
<p>The programme is prepared based on the Centre's activity trends approved by the Republic of Lithuania Government Resolution No 1800 of 23.12.2009 (Official Gazette 2009, No 158-7186). The significance of the national development of science, including the programme at issue, lies in ensuring the country's international competence, economic progress based on sustainable development, and competitive production, which jointly lead to high standards of living of the society. The purposes listed above are being realised seeking the recognition of Lithuanian scientists in the fields of ecology, botany, zoology, geology and physical geography, which is based on collaboration with the international scientific community and modernisation of scientific investigations through integration of novel technologies and methods. One of the principal factors ensuring further development of national scientific research and highlighted in the programme is the preparation of young skilled researchers who would work with state-of-the-art technological solutions and create novel research methods, develop modern research trends, pursue the already existing trends, and actively and productively work in the global scientific research area.</p> <p>Government priority:</p> <p>To promote the country's progress in scientific research and technologies, to develop the information and knowledge society, and to increase the financing of education, culture, scientific research and health care.</p> <p>Name of the goal of the programme:</p> <p>To pursue global-level scientific research and experimental development in the area of natural sciences and to prepare highly skilled researchers</p> <p>Task:</p> <p>01 - To pursue experimental development of scientific research in the area of natural sciences and ensure the progress of doctoral studies</p> <p>Measure:</p> <p>01 – To investigate the state of natural ecosystems, Earth's entrails and its surface, and biological resources and to ensure experimental development of scientific research</p> <p>02 – To prepare highly skilled researchers in the area of natural sciences</p> <p>Programme executives: Nature Research Centre</p> <p>Number of staff positions for the implementation of the programme in the year 2022: 299</p> <p>Programme coordinator: Nature Research Centre's Director Sigitas Podėnas, e-mail sigitas.podenas@gamtc.lt</p>

Thematic priorities

As a basic source of energy and recreational resources and the fundamental precondition for economic and industrial development of the country, natural resources and ecosystem services are of immense economic and social importance in ensuring the welfare and prosperity of the country and its people. The need for natural resources is steadily growing, and their depletion, due to the currently prevalent business models, our country's infrastructure and social habits, is too fast. Intensive and irresponsible exploitation of natural resources promotes structural changes in ecosystems and biodiversity decline producing a negative feedback effect on the environment, human health, and national economy. Efficient and sustainable use of resources and ecosystem services through the application of eco-innovations, ecosystem-friendly and ecosystem restoring measures as well as solutions for alternative use of resources is still receiving insufficient attention. Therefore, EU and Lithuania aim for integrating the growth of national economy and life quality improvement with the sustainable use of ecosystems and their resources. Scientific and applied research conducted in this area and forming the basis for eco-innovations is recognized as one of the key factors in ensuring the preservation of our country's ecosystems and sustainable society development.

Context of the planned activities of the Centre includes:

- a) development of long-term scientific research in the fields significant for the continuity and development of society and national economy, i.e. ecology, botany, mycology, microbiology, virology, zoology, parasitology, geology and physical geography;
- b) training of highly qualified scientists;
- c) cooperation with representatives of business, government and society in carrying out scientific research and experimental development works, ensuring patent activities;
- d) assurance of Lithuania's competence in context of nature conservation and management of the natural resource on the international scale;
- e) maintenance and development of scientific contacts with national and foreign research centres and researchers working therein by participating in international and national scientific research programmes;
- f) expert assessment of the fundamental and applied science programmes and projects, provision of consultations within the competence of the Centre;
- g) dissemination of scientific knowledge, its introduction into culture, education, and health care alongside with the application in social and economic activities, cooperation in creating a circular, innovation- and knowledge- based economy, building a knowledge-intensive society.

Context of the planned activities of the Centre includes

Strategic trends of the programme

Scientific research and experimental development (R&D)

In the Centre, fundamental scientific research and experimental development are pursued in view of the strategic provisions and goals of the European and global scientific research area, which are designed to ensure public welfare in the context of natural and social

changes taking place in the contemporary dynamic world. In spite of multiple innovations, the living and non-living nature remains the essential human survival resource and the factor determining the quality of the living environment. It is obvious that the need for natural resources is constantly growing, and many contemporary business models, current infrastructure and the habits of the society lead to an excessive use of natural resources. Intensive and irresponsible use of natural resources induces changes in ecosystem structure and degradation of biological diversity, which has a negative impact on the environment, human health and country's economy. It is globally acknowledged that little attention is paid to the efficient and sustainable use of resources and ecosystem services through employment of ecological innovations and application of ecosystem saving and restoring measures as well as alternative resource use solutions. Therefore, the EU and Lithuania are seeking to achieve that the country's economic growth and improving living quality would be integrated with sustainable use of ecosystems and their resources. It is recognised that in this context scientific and applied research constitute one of the crucial factors ensuring a successful preservation of our country's ecosystems and sustainable development of the society.

To summarise the above, we can state that high-level global scientific research is the essential goal of the Centre's activities, which could be attained through implementation of the following tasks:

- to increase the competitive ability of the Centre's researchers in the global research area **by raising the quality of scientific research** through integration of intellectual, financial and technical resources;
- **to increase the internationality of scientific research** through every possible promotion of the Centre's scientists to participate in international scientific research networks, projects and workshops;
- **to increase** the Centre's **intellectual potential** by promoting employees' refresher training and attraction of skilful researchers;
- **to ensure the dissemination of** the Centre's scientific research activities and **obtained results** through publications in **international journals with the highest impact factor and presentations at international research forums**;
- **to rationally use and continuously update** the Centre's **technical potential**; and
- **to focus on the implementation of scientific ideas through creation of** final prototypes and examples of products, processes, tools, etc. necessary for industry and **economy**.

Doctoral and post-doctoral studies

To ensure the country's economic and social welfare and its competitiveness both on a European and global scale, it is necessary to prepare highly skilled researchers able to compete in the global scientific research area and successfully fulfil expectations of industry. The Centre takes active part in the process of implementation of five programmes of doctoral studies and is planning to undertake the following activities:

- **to activate the participation in the process of doctoral and and post-doctoral studies** by attracting the most promising candidates;

- **to ensure the internationality of students**, including involvement of foreign students, post-doctoral fellows and supervisors into the process of studies;
- **to promote student mobility** by supporting active participation of students in international study programmes and schemes;
- to enable and **promote participation** of candidates **in the process of post-doctoral studies** and focus on their mobility; and
- **to create conditions** for the most promising young researchers **to continue scientific career in the Centre**.

Social dialogue

In the Centre, a special focus is put on fundamental research that has a wide spectrum of application, including investigation of the composition, structure and functions of current biological diversity components in conditions of global climate change and anthropogenic impact; analysis of quantitative and qualitative dynamics of Earth's entrails and its surface; and development of rational strategies for the use and protection of nature in view of European Union's and globally recognised tendencies. The results of investigations pursued by the Centre's researchers are exclusively important in ensuring our country's competence in international science and governance organisations and in implementing regional and global programmes in the fields of environmental protection and use and development of modern branches of economy. To satisfy public demand for scientific information and to make knowledge available to a possibly wider range of the society, it is planned:

- **to satisfy a** geographically unique **demand for the results of high-level national and regional scientific investigations;**
- **to activate scientific communication** at international, national, regional and local levels and make scientific information available to the public;
- to **develop social dialogue** with the public sector and business entities by publicizing the Centre's scientific potential and its application prospects;
- **to collaborate with educational institutions** and educate the society about different issues of nature protection and use;
- **to ensure social and scientific dialogue with** different level **educational institutions;** and
- **to enhance the prestige of scientific career** and its popularity among the public.

VIII. DIRECTIONS FOR INCREASING THE EFFECTIVENESS OF ACTIVITIES IN 2023–2025

Efficiency of the Centre's R&D activities is going to be increased in the following ways:

- by increasing the number of published international-level scientific articles (especially those falling into TOP-10 category) as well as the contribution of Centre's researchers to such publications;

- by reducing the amount of budget allocations for the preparation of one international-level scientific article;
- by seeking to implement a greater number of projects, with emphasis on international projects;
- by boosting Centre's activity related to the organization and implementation of the third-level university studies, with emphasis on the attraction of doctoral students and post-doctoral trainees from foreign countries;
- by actively developing cooperation with national and foreign economic and industrial and state management institutions;
- by ensuring the fulfilment of the national economy needs in the fields of innovative nature management and conservation;

Table 8. Information about the directions for increasing the effectiveness of the institution's activities in 2023-2025

Area of general activity	Planned works	Awaiting result	Implementation deadline
1. Research and experimental development in the field of natural sciences	To increase the number of scientific works published in international publications, emphasizing those assigned to the highest categories of publications, and to improve the contribution of the Centre's scientists to publications that meet the highest international evaluation criteria.	Number of top international research papers: 2022 – 129; 2023 – 140; 2024 – 150; 2025 – 150; The share of research papers in international scientific publications from all published papers (%): 2022 – 78; 2023 – 79; 2024 – 80; 2025 – 85;	Annually Annually
2. Research activities	To aim for the growth of the number of high-budget projects in the total volume of implemented projects	The amount of allocated state budget funds for the preparation of one international research paper (thousands of EUR): 2022 – 26,7; 2023 – 26,7; 2024 – 25,4; 2025 – 25,4;	Annually
3. Training of highly qualified researchers in the field of natural sciences	To increase the centre's activity during third-level university studies	The number of PhD students studying: 2022 – 51 2023 – 58; 2024 – 60; 2025 – 60;	Annually

IX. PRELIMINARY RESULTS OF THE PROGRAMME IMPLEMENTATION

The significance of the programme pursued by the Centre lies in ensuring the country's international competence, economic progress based on sustainable development, and competitive production, which jointly lead to high standards of living of the society. The goals mentioned above can be achieved in pursuit of recognition of Lithuanian scientists in research fields of ecology, botany, zoology, geology and physical geography, which is based on collaboration with the international scientific community and modernisation of scientific investigations through integration of new technologies and methods. The fact of communicating the Centre's scientific results to the international scientific community evidences the Centre's scientific community's high competence, its competitiveness in the global scientific research market, and the potential of commercialisation and use of obtained results for the purpose of improving public welfare. The latter area of the Centre's activities is exclusively important in searching for sustainable and renewable raw materials resources, as well as modern manufacturing technologies and reliable waste treatment ways and methods necessary for the creation of safe and human-friendly environment. One of the principal factors driving further development of national scientific research and highlighted in the programme is the preparation of young skilled researchers working with state-of-the-art technological solutions and creating novel research methods, forming state-of-the-art research trends, and actively and productively working in the global scientific research area. The above-mentioned criteria are essential seeking to ensure the Centre's high-level scientific activities and implementation of strategic goals.

The outcomes of the programme *Development of national science and scientific research and experimental development in the area of natural sciences* pursued by the Centre are related with the increasing number of scientific publications in top-ranked global scientific journals (Fig. 2), dynamics in the number of budgetary appropriations for publishing (Fig. 3, 4), and increase in the number of doctoral students studying in the Centre's doctoral programmes (Fig. 5) postdoctoral fellows.

In recent years, the number of articles that Centre's researchers publish in top-ranked international journals has been continuously growing. Several articles prepared in co-authorship were published in such prestigious journals as *Science* (Sjoberg, S., **Malmiga, G.**, Nord, A., Andersson, A., Backman, J., Tarka, M., Willemoes, M., Thorup, K., Hansson, B., Alerstam, T., Hassequist, D. 2021. Extreme altitudes during diurnal flights in a nocturnal songbird migrant. *Science*, 372 (6542): 646–648). The ratio between the planned indicator and actual result can be seen in the diagram.

Third-cycle university studies, i.e. doctoral studies, is a priority area of the Centre's activities, and great attention is paid to it both as regards attraction of the most promising candidates to these studies and ensuring the quality of studies and future possibilities of young researchers through establishment of the Early Career Researcher Committee at the Centre. The total number of doctoral students studying under five doctoral programmes (ecology and environmental science, biology, zoology, geology, and physical geography), including students from foreign countries: Brazil, France, Russia, Ukraine, etc.) is constantly increasing in the Centre. Doctoral students take active part in international studies and exchange programmes and international research projects, as well as improve skills in foreign research centres. The Centre is successfully pursuing competitive postdoctoral fellowship projects. The number of such projects is constantly increasing. A great number of postdoctoral fellows involved in such projects are from foreign countries.

Dynamics of top-ranked publications in the institution

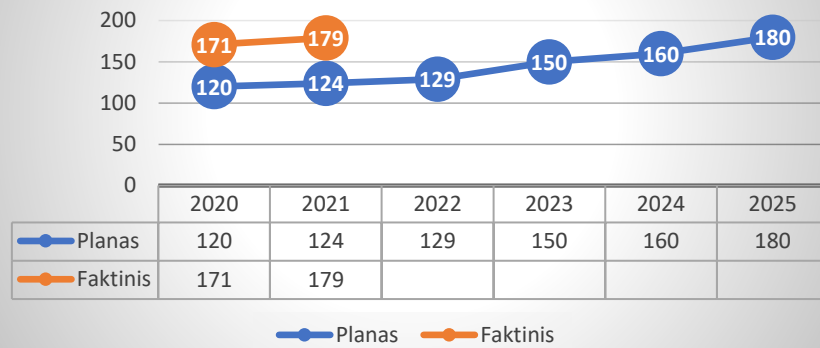


Fig. 2. Dynamics of top-ranked publications in the institution

Effect criterion E-01-01 dynamics

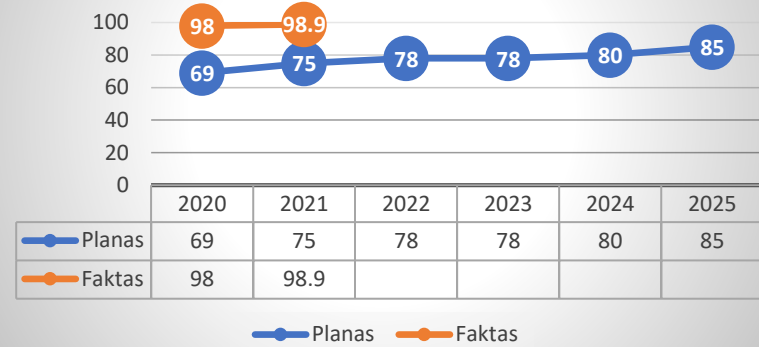
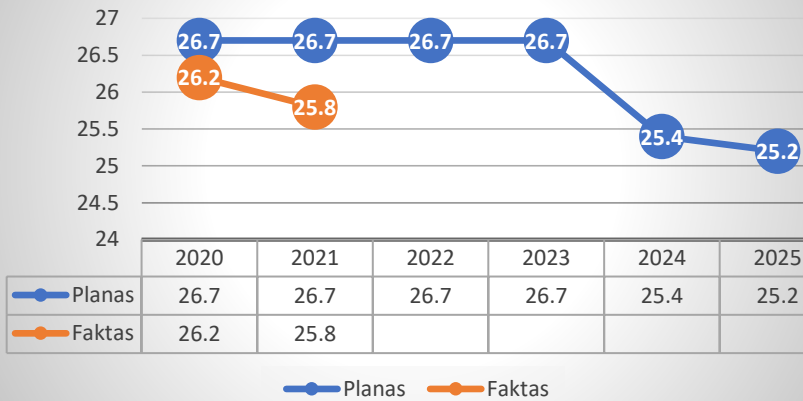


Fig. 3. Effect criterion E-01-01 dynamics

Effect criterion E-01-02 dynamics



Dynamics of the number of doctoral students in the institution

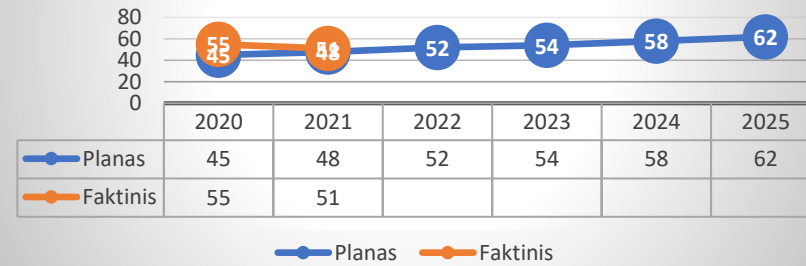


Fig. 4. Effect criterion E-01-02 dynamics

Fig. 5. Dynamics of the number of doctoral students in the Centre

Strategic planning methodology

Annex 7

TECHNICAL ANNEX TO ASSESSMENT CRITERIA

2023-2025

(The reference period)

Name	Code
Manager of the state budget appropriations: Nature Research Centre	
The purpose of the programme: To carry out international-level research and experimental development in the field of natural sciences, to train highly qualified researchers	12.001.11.
Effect assessment criterion: Share of research papers in international publications from all published papers (percentage)	E-01-01

1	Definition	The proportion of the Centre's research production is assessed by the highest level of research production - papers published in journals with a citation index.
2	Is this a new assessment criterion?	Yes
3	Justification of choice	The criterion allows to evaluate the efficiency of the institution's research production and its dynamics. Papers in journals with a citation index are the main indicator according to the assessment

		methodology of research (art) works of scientific and study institutions.
4	Calculation method	$X/Y*100$, where X is the number of papers published in journals with a citation index per year, Y is the total number of research papers published per year.
5	Data source	Individual and laboratory annual reports.
6	Data auditing	Papers published in journals with a citation index during the year are checked for compliance with the criterion according to <i>Clarivate Analytics</i> databases. The institution's data are checked by the LSC experts.
7	Regularity of calculation	Once a year.
8	Contact person responsible for the assessment criteria	Deputy Director for Science Miglė Stančikaitė (migle.stancikaite@gamtc.lt)
9	Other information about the reliability of the assessment criterion	
Name		Code
Manager of the state budget appropriations: Nature Research Centre		
The purpose of the programme: To carry out international-level research and experimental development in the field of natural sciences, to train highly qualified researchers		12.001.11
Effect assessment criterion: The amount of allocated state budget funds for one international research paper (thousand LTL)		E-01-02

1	Definition	It is estimated how much of the budget allocations in the institution per one unit of the highest level of scientific production.
2	Is this a new assessment criterion?	Yes
3	Justification of choice	The criterion makes it possible to evaluate the use of the institution's budget allocations to ensure the level of education and its dynamics.
4	Calculation method	$X/Y*100$, where X is the number of papers published in journals with a citation index per year, Y is the budget allocation per year.
5	Data source	Individual and laboratory annual reports. Economics and Finance Department.
6	Data auditing	The institution's data on research production are checked by LSC experts. Internal control system.
7	Regularity of calculation	Once a year.
8	Contact person responsible for the assessment criteria	Deputy Director for Science Miglė Stančikaitė (migle.stancikaite@gamtc.lt)
9	Other information about the reliability of the assessment criterion	

Name	Code
Manager of the state budget appropriations: Nature Research Centre	
The purpose of the programme: To carry out international-level research and experimental development in the field of natural sciences, to train highly qualified researchers	12.001.11
Programme: National science development and scientific experimental development in the field of natural sciences	12.001
Result assessment criterion: Share of experimental development funds from the allocated state budget allocations, in percentage	R-01-01-01-01

1	Definition	It is assessed what part of the state budget allocations is made up of the funds received by the institution for the services provided.
2	Is this a new assessment criterion?	Yes
3	Justification of choice	The criterion makes it possible to assess the institution's ability to earn additional funds
4	Calculation method	$X/Y*100$, where X – experimental development funds, per year, Y – state budget allocations per year.
5	Data source	Economics and Finance Department.
6	Data auditing	Internal control system.
7	Regularity of calculation	Once a year.
8	Contact person responsible for the assessment criteria	Olga Narkevičienė (olga.narkeviciene@gamtc.lt)
9	Other information about the reliability of the assessment criterion	

Name	Code
Manager of the state budget appropriations: Nature Research Centre	
The purpose of the programme: To carry out international-level research and experimental development in the field of natural sciences, to train highly qualified researchers	12.001.11
Programme: National science development and scientific experimental development in the field of natural sciences	12.001
Result assessment criterion: The number of PhD students studying	R-01-01-01-02

1	Definition	It is estimated how many doctoral students study at the institution.
2	Is this a new assessment criterion?	No
3	Justification of choice	The number of doctoral students shows the potential of training highly qualified researchers.
4	Calculation method	N, where N is the number of doctoral students studying at the institution per year.
5	Data source	Legal and Human Resources Department
6	Data auditing	Internal control system.
7	Regularity of calculation	Once a year.
8	Contact person responsible for the assessment criteria	The chief specialist for personnel Jurga Šilinskaite (jurga.silinskaite@gamtc.lt)
9	Other information about the reliability of the assessment criterion	

Name	Code
Manager of the state budget appropriations: Nature Research Centre	
The purpose of the programme: To carry out international-level research and experimental development in the field of natural sciences, to train highly qualified researchers	12.001.11
Programme: National science development and scientific experimental development in the field of natural sciences	12.001
Product assessment criterion: Number of international research papers	P-01-01-01-01-01

1	Definition	The research potential and its dynamics are assessed
2	Is this a new assessment criterion?	Yes
3	Justification of choice	The criterion allows for the quantitative assessment of the institution's highest level research output.
4	Calculation method	N, where N is the number of published international research papers per year.
5	Data source	Individual and laboratory annual reports.
6	Data auditing	Papers published in journals with a citation index during the year are checked for compliance with the criterion according to <i>Clarivate Analytics</i> databases. The institution's data will be checked by LSC experts.
7	Regularity of calculation	Once a year
8	Contact person responsible for the assessment criteria	Deputy Director for Science Miglė Stančikaitė (migle.stancikaite@gamtc.lt)
9	Other information about the reliability of the assessment criterion	

Name	Code
Manager of the state budget appropriations: Nature Research Centre	
The purpose of the programme: To carry out international-level research and experimental development in the field of natural sciences, to train highly qualified researchers	12.001.11
Programme: National science development and scientific experimental development in the field of natural sciences	12.001
Product assessment criteria: Amount of funds received from international projects and experimental development in thousand Eur.	P-01-01-01-01-02

1	Definition	The amount of funds received for international projects and experimental development works is assessed.
2	Is this a new assessment criterion?	Yes
3	Justification of choice	The criterion allows to assess the institution's ability to attract and implement international and experimental development projects, their dynamics.
4	Calculation method	N, where N is the funds received during the year, after the implementation of international projects and experimental development works.
5	Data source	Finance Management Department.
6	Data auditing	Internal control system
7	Regularity of calculation	Once a year
8	Contact person responsible for the assessment criteria	Deputy Director for Science Miglė Stančikaitė (migle.stancikaite@gamtc.lt)
9	Other information about the reliability of the assessment criterion	

Director

Sigitas Podėnas