Evaluation of research and professional activity of research-oriented institutes of the Czech Academy of Sciences for the period 2015–2019

Final Report

Name of the Institute: Institute of Botany of the CAS, v. v. i.

Evaluated teams and their leaders:

1. Department of Taxonomy (Zdeněk Kaplan)
2. Department of Evolutionary Plant Biology (Pavel Trávníček)
3. Department of Population Ecology (Zuzana Münzbergová)
4. Department of Invasion Ecology (Petr Pyšek)
5. Department of GIS and Remote Sensing (Martin Kopecký)
6. Department of Functional Ecology (Jiří Doležal)
7. Department of Vegetation Ecology & Laboratory of Paleoecology (Radim Hédl)
8. Department of Mycorrhizal Symbioses (Martina Janoušková)
9. Centre for Phycology (Klára Řeháková)
10. Department of Experimental Phycology and Ecotoxicology (Blahoslav Maršálek)

Part A: Evaluation of the institute

Strengths:
The Institute of Botany (IB) is an internationally recognized, very large institute, and is one of the major players in the Europe in the field of Botany with a notable critical mass of scientists. The expertise of IB relies on its strong taxonomical basis and includes many relevant sub-fields of plant sciences, and includes both experimental and field data-based approaches. Especially subfields of ecology are well represented. IB has a clear mission that seems to be well followed. Age structure is relatively balanced, including many earlier career researchers and some seniors that are soon about to retire. All teams have good international networks and publication output overall is excellent. Department of Invasion Ecology is clearly one of the world-leading units in its field, with highly cited researchers. Researchers are evaluated at least every five years, based on their scientific activity and capacity to present their research to the scientific community. In general, there is plenty of infrastructure and human resources to support its utilization and maintenance. The unit's website is clear and informative.

Weaknesses:
Most of the teams suffer a lack of lead-position involvement in high-level internationally (e.g. European Commission) funded projects. There is strong dependency on success of receiving national grants as 70% of the salaries are indicated as grant-based. Costly is the maintenance of the UNESCO World Heritage Site that requires plenty of resources and staff. The unsatisfactory technical state of some buildings does not match present day requirements on a research facility.

Opportunities:
IB is clearly an internationally attractive institute, so recruiting doctoral students and postdoctoral researchers is likely an easy task. The institute is involved in editorial boards of many relevant journals, which partially may provide opportunity to control and influence the development of the field. Advances of LiDAR technology and GIS-based approaches may be asset in the future. The structure of the IB should be flexible: Departments could be abolished, merged, or divided so that new promising research directions can be supported. Administrative burden for all researchers should be decreased. In the unit's strategy, special attention should be paid to new research groups, their early autonomy, and their budget. Separate units that are located close to collaborating universities can be considered as an asset, as they provide students and possibility to teach. Possible national level collaboration with Global Change Research Institute of the CAS is recommended as many of the research topics are overlapping.

Threats:
Maintaining infrastructure (especially UNESCO World Heritage Site) may be challenging if there are national cuts (due Covid-19, or other reasons) in major budget. The reorganization and redirection of weaker units is challenging.

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
Excellent quality, average rating of the teams of the institute is close to 2. The distribution of quality of submitted outputs based on Phase I is also very good with 16% as World Leading and 66% of outputs as World Leading+Internationally excellent.	
H1.2	**Contribution of workers on the outputs reached**

Workers have generally contributed well to the outputs, in some of the teams the proportion is very high.	
H1.3	**Quality of all outputs and results**
The overall quality of output is at an excellent level, including some world-leading research.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
IB researchers have provided many key discoveries, for example in different subfields of ecology (e.g. invasion ecology, functional ecology and vegetation ecology), GIS and remote sensing, and evolutionary biology. Research of IB plays notable importance for the field of botany nationally and internationally.	
H1.5	**Contribution of the participation of the authors in large collaborations**
Many research outputs are results of large international collaboration and an average of 64% of IB publications (2015-2019) have involved international collaboration, with an increasing share.	

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	**Societal relevance of outputs and results pursuant to CAS and institute mission**
Many of the outputs and results have a clear societal relevance. This relevance is important, for example in providing information for environment protection, conservation, biodiversity loss, bioeconomy, environment-friendly agro-technology, soil re-cultivation and fertilization.	
H2.2	**System functionality for knowledge transfer into practise, its usefulness for society. The impact of the institute´s activity on proper practice in society in the area of social sciences and humanities**
For example, plant species atlases and identification guides produced be IB researchers can be directly utilized by society and play an important role for biodiversity studies and nature conservation in Czech Republic.	
H2.3	**Relation to practice**
Many of the IB‘s research has applications to practice with various potential to users. A number of contractual research projects are listed. Generally, the institute has great potential and has also identified a number of areas with great relation to practice but more effort is required to materialise this. High potential is predicted in the following areas: 1) Environment protection (methods, recommendations, expert maps, public databases and software, 2) biodiversity conservancy, mitigation and adaptation to climate change measures for direct application in nature protection, 3) environment-friendly agro-technology, soil re-cultivation and fertilization through the applications of bio-fertilizers, hemp production technology, 4) water quality protection and new nature-based water cleaning approaches and 5) technology and compounds based on deep knowledge of ecology and metabolomes of micro-algae, cyanobacteria and lichens.	
H2.4	**Participation in AV21 strategy**
IB participated in the research programme „Diversity of life and health of ecosystems“ by 1) supporting the functioning and popularization of the biological collections and 2)	

establishing the platform for the water and soil landscape with the aim to build intersectoral cooperation.

H2.5	Cooperation with regions of the Czech Republic
IB cooperated with different regions on the support and advancement of nature protection. This includes the cooperation in cross-border regions realized within the framework of the INTERREG program funded by the European Regional Development Fund and implemented in cooperation with cross-border partners (universities and national parks). IB partnered with the Central Bohemia Region within a mobility program that attempts to bring experienced researchers to the region and to promote research capacity in the business sector.	

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the teams and the institute with similar international and national institutes
Teams of the institute are overall positioned at an excellent level in international comparison. IB is one of largest of its kind in the field of botany in Europe, having notable impact to the field.	

D1.2	Scope and quality of international and national cooperation and the role of the institute in such cooperation; engagement in broad international cooperation
IB is well networked internationally, and both international and national collaboration plays a crucial role in its research activities. Teams of IB have strong links to research groups abroad but mainly through informal relationships. Still the number of publications resulting from such collaborations has increased and in many cases it has led to excellent quality outputs. Nationally, all major Czech universities are natural partners of the teams of the IB.	

D1.3	Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)
IB workers have actively participated in scientific community activities by organizing numerous conferences and workshops, and presenting invited lectures. IB workers have also received many awards of various levels.	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
IB aims to keep and support the complex expertise already present at the institute but leaves plenty of freedom to researchers to follow their research interests. Overall, the current research is well in line with the institute's mission.	

D2.2	Assessment of the previous research objectives and their achievement
All IB researchers are evaluated at least every five years, the interval between evaluations ranges between one and five years. Also IB teams were evaluated in 2018 and will be evaluated every two to three years in order to provide the departments with more frequent feedback, and thus enabling swift response in a shorter time horizon than the five-year evaluation at the level of the entire CAS. Evaluation is based on several criteria, which include both scientific and other activities related to the research and development of the	

institute. The research plan has essentially been fulfilled and the departments maintained the proposed research direction with only occasional deviances.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
IB has reacted promptly on recommendations from the past evaluation, reflecting on its research, management and updated internet pages.	
D2.4	**Success in receiving grants**
Teams of the IB have been generally successful in receiving grants, totalling > 18,4 M€. This equals roughly ~0,06 M€ per FTE when the staff of the whole institute is being considered.	
D2.5	**Adequacy of instrumental equipment**
IB has plenty of adequate instrumental equipment.	
D2.6	**Effectiveness of management**
Institute is managed effectively.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
IB aims to create a good workplace culture in a broad sense, by focusing on transparency of the recruitment process, support for newly hired scientists, support of personal professional development of both the supportive staff and researchers, mentoring and education in leadership in the advanced phase of their careers. IB aims to have special attention to new research groups, their early autonomy, and their budget. Also, to support the internationalization, since special attention will be paid to the recruitment of researchers from abroad. The majority of staff (90%) are Czech nationals with only 10% foreign nationals (predominately postdocs). This is an area for future improvement. Unfortunately, no detailed data on gender balance were provided.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
Possible gender issues are not highlighted, but IB aims to clarify its internal rules and organizational structure so as to make them readily available and clear to the entire staff. In particular, the rules related to working conditions, remuneration and career advancement will be addressed.	
D2.9	**Relation of the institute with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.**
N/A	

Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	**Scope of cooperation with universities on national and international level**
Cooperation with national and international universities is active and mutually beneficial.	
D3.2	**Effectiveness of joint research centres**
IB cooperates closely, officially and unofficially, with joint research centres.	

D3.3	Success rate in supervision of PhD students
IB has been successful in PhD supervision, 7 % of the staff (24 person) being graduate students. However, the total number of PhD remains relatively low and this is an area for future improvement	
D3.4	**Participation of PhD students in the outputs**
PhD student participate actively in the outputs.	
D3.5	**Participation of the institute in master or bachelor studies**
The teams of the institute provide teaching and supervision at the collaborating universities.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Cooperation intensity with universities is high.	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
IB has been very active in research popularization through various channels (lectures, excursions, interviews, science fair and exhibitions).	
D4.2	**Publishing activities and its quality**
IB has a high activity in publishing scientific books and periodicals.	
D4.3	**Participation in professional organisations in the area of research and development**
Members of the institute show high activity in organizing scientific conferences and workshops as will be described in more detail in the reports of the teams.	

Other comments of the commission:

IB is an important research institution in the field of ecological plant science, well recognized both nationally and internationally.

Part B: Evaluation of teams

1. Department of Taxonomy

Strengths:
The team provides fundamental skills to the whole institute. Its members are very productive and their work is of excellent standard. The diversity of specialisms within the team is very convincing and covers vascular plants, lichens, and fungi. The team also uses state of the art molecular and cytogenic approaches to maximum benefit.

Weaknesses:
There exist challenges in training the next set of experts in the field - the length of time it takes to train a student etc and the length of time it takes to carry out this work doesn't fit well with a 3-year model of funding.

Opportunities:
There is the opportunity to acquire more funding in the fields of biosystematics and conservation applications/collaborations of their research. The team should continue to deepen their already extensive international research collaborations with a view to collaborative joint research funding and projects. The „Pladias" database is a very significant development with real potential for impact in research and conservation efforts nationally and internationally.

Threats:
This is a small group of individuals with an enormous number of activities – carrying out critical work. There is a risk of over stretching here, and so supports and stabilising resources where possible should be firmly in place. The difficulty in attracting PhD students to train as the next generation of taxonomist should be addressed. A lack of funding opportunities for Alpha-taxonomy nationally and internationally to retain the experience and expertise within the system poses a severe threat.

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
There were 157 outputs in the evaluation period. 17 of which were evaluated in Phase I. 9 were in the top decile, plus an additional 3 in the top quartile with the remaining 5 in the 2nd Quartile. This shows a good level of activity in very good international journals. There is a large proportion (69/157) of output in the 3rd and 4th quartile – this is a direct consequence of the descriptive nature of taxonomic research and is standard across this discipline. Overall the department is producing very good quality output and maintains important databases and collections.	
H1.2	**Contribution of workers on the outputs reached**
For the outputs evaluated in Phase I the team has contributed to the majority of first author positions and senior author positions (13/17 outputs). Highly specialised skill sets in their team members provide important contributions to many areas.	
H1.3	**Quality of all outputs and results**
The team is performing well and has a very good output in a broad range of topics from cryptic diversity, hybridisation and taxonomic revisions, diversity and ecology of lichens, to WGD and polyploidisation and evolution and systematics of fungi. They are also	

significantly contributing to important national monographs, physical collections and online collections/databases. From the metrics we can see they are performing well with world leading+internationally excellent outputs well above the average and when examining the papers on which they lead (reprint author) they are well above the average for world leading and internationally excellent categories.

H1.4	The most valuable discoveries and findings in the fields, their importance for the field
As one would expect given their remit in alpha taxonomy of vascular plants, fungi and lichens, the majority of the findings contribute to the following topics/areas of the field: Plant sciences, mycology, ecology, and evolutionary biology. With so many topics researched in the evaluation time period, it isn't fruitful to extract or highlight any individual paper. Rather it is important to note that the overall quality of the output of this team is very good.	

H1.5	Contribution of the participation of the authors in large collaborations
The team has extensive collaborations nationally and internationally. The publications evaluated in Phase I show that they are lead author (i.e. first and/or reprint) on 13/17 of their evaluated outputs. Whilst overall 68% of their overall output involved international collaboration they are designing and conducting the majority of this work within their team. The team shows effective collaboration without developing a dependency – it appears they have reached the highly sought-after optimal balance for collaborative work for which they are to be commended.	

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
This team provides fundamental expertise and knowledge to the national and international community. This is directly in line with CAS objectives and the mission of the institute. Their work is also contributing successfully in engaging the general public.	

H2.2	System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team´s activity on proper practice in society in the area of social sciences and humanities
At a very fundamental level this team has expertise and is providing training for people to accurately identify plants. This is essential for bioconservation, biodiversity and for many other areas of research. This is a very highly sought-after skill – yet very few people have the expertise. They are publishing output that is bringing understand the diversity of flora in the Czech Republic and in identifying invasive species. Therefore, this is very useful and important for society as a whole but also for the international community as we come to grips with biodiversity issues and extinctions.	

H2.3	Relation to practice
Some results of the team are used at the national and international level to strengthen plant species monitoring, in particular through their database and their monographs dedicated to description of flora.	

H2.4	Participation in AV21 strategy
They do not provide details in their report on this point but I suspect it would be very difficult to have a successful future foods strategy without this expertise.	

H2.5	Cooperation with regions of the Czech Republic

They have an extensive cooperative network across the Czech Republic as detailed previously.

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the team with similar international and national institutes
This team is performing on par with teams of similar discipline and size internationally and nationally.	
D1.2	**Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation**
As stated in H1.5 above, the team has excellent cooperation with national and international colleagues and is producing very good quality output from their collaborations. To mention two specific cases that demonstrate their successful cooperation and collaboration: (1) the PLADIAS database and (2) Flora of the Czech Republic both of which are of national and international interest.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
The team has been very active in a wide range of scientific community activities: team members hold many leadership and membership roles in several research societies and on several research bodies including academy assembly member of CAS, the governments expert advisory board, Czech botanical society, World Flora Online committee, various committees at the universities and national museum, and editorial roles in national journals/bulletins and international journals. They have organised 5 main conferences and workshops in this evaluation period ranging in size from 35 to 180 participants and covering their broad range of interests. They have also received 5 nationwide awards to various different team members for their scientific contributions.	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
Their planned research activities are to continue with what they do as well as taking on a number of new projects.	
D2.2	**Assessment of the previous research objectives and their achievement**
They have a spread of expertise across the major groups and are publishing from their research.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
They have successfully implemented many of the recommendations of the past evaluation, they have increased their use of molecular approaches, have focussed on WoS output and have maintained a healthy balance of monographs and research output. However, a number of the recommendations were not achieved in the period. They seem to have had some funding issues which has hampered their completion of the Czech Flora volume. They have re-scheduled this for 2 years from now to be with Publisher. They have sadly suffered a loss of a team member which has delayed the completion of the monograph of the endemic species that was being led by that member. However, this monograph seems	

to be in first draft and they have scheduled it for completion in 2 years. The global monograph of the enigmatic Potamogetonaceae species has not been completed also due to lack of funding.	
D2.4	**Success in receiving grants**
There seems to be a bit of a mixed bag in this regard. Involvement on some collaborative work seems to have gone well in the evaluation period, but funding for some of their core activities seems to have suffered (as mentioned above: the inability to complete certain tasks due to lack of funding). In addition, it is unclear what the international funding trajectory is like and in order to keep those international collaborations functioning and progressing it may be necessary to consider also international funding.	
D2.5	**Adequacy of instrumental equipment**
The vast majority of their WoS-indexed output involves their molecular work – in this regard facilities seem to be adequate for their needs at present. This is critical to their success and to their contribution to some high impact publications and therefore essential to continue to fund well.	
D2.6	**Effectiveness of management**
The team seems to function well. Researchers are periodically (once in 1–5 years) evaluated by an external committee.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
There is a very different age spread in this group in comparison to others. We encourage support for funding of PhD students and junior researchers to provide a larger stream of new junior level talent.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
Nothing to add.	
D2.9	**Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.**
No details provided.	

Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	**Scope of cooperation with universities on national and international level**
The team is cooperating with Charles and Masaryk universities for the delivery of lectures, seminars and courses to all three levels: Undergraduate, MSc and doctoral level in topics within their expertise.	
D3.2	**Effectiveness of joint research centres**
This team is embedded in many areas of research happening in centres across the country. For research and education, they are working with Charles and Masaryk universities, and through the PLADIAS project they also made a joint research centre with the university in South Bohemia but including membership across the country. This research centre and the collaborations and connections within and across universities and	

their own institute have meant they are well placed for involvement in national efforts and national funding opportunities.	
D3.3	**Success rate in supervision of PhD students**
The number of PhD students completed in the evaluation period is low at 3. However, we do recognise that this area of research is far more time consuming than other areas and is not amenable to multiplexing.	
D3.4	**Participation of PhD students in the outputs**
The students are heavily integrated into larger scale projects that are being carried out in the team. This environment gives a good training opportunity for the students and leads to their primary positioning on publication output from their efforts.	
D3.5	**Participation of the team in master or bachelor studies**
The team members teach primarily in Charles and Masaryk Universities, where they teach on Bachelor and MSc programs - all appropriate topics and levels. The level of involvement here seems appropriate.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
The PhD students seem to be registered mostly with Charles University. Members of the team are on the PhD research committee at Charles university which likely provides benefits in terms of increasing cooperation between the institutes.	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	**Sufficiency of media strategy and activities in the area of research popularisation**
The team gave 9 public lectures, radio and TV broadcasts and wrote many articles for popular science magazines. They have also been very busy with over 39 field courses for the public – this is a wonderful and interactive way to popularise their research and this is to be commended. They have also published an important key for Czech Flora which is being used by ecologists, conservationists, teachers, etc. and the general public. PLADIAS is also an important tool in popularisation of their research as a web extension of their publications on Czech Flora, and has significant engagement from the public.	
D4.2	**Publishing activities and its quality**
Their publication activities for outreach are commented upon in D4.1 above. To summarise: they have a healthy set of activities in this area that are proving to be popular with the public.	
D4.3	**Participation in professional organisations in the area of research and development**
The team is well integrated at the national level into various professional organisations. Locally they participate in teaching at Charles University, and Masaryk University. They had 3 PhD students and 6 MSc students graduate in the evaluation period. As mentioned in D1.3 many of their members play leadership roles in various professional organisations e.g. PhD committees at the university, scientific council and are members of the Czech Botanical society. They also participate in editorial work for various journals and bulletins.	

Other comments of the commission: None.

2. Department of Evolutionary Plant Biology

Strengths:
The team has an excellent record of high-quality publication. The age and gender profile of the team are well balanced. The team collaborates with some world leading groups, and should take advantage of this strength to consider international calls for projects (e.g. ERC) in order to further consolidate the international position of the team.

Weaknesses:
The societal impact of the research could be improved. The cooperation level with universities is low and limited to the delivery of lectures and supervision of students. Also the engagement with public/outreach could be improved. Thinking creatively about online tools for this may be very cost and time efficient.

Opportunities:
The team is internationally recognized and relies on a strong international collaboration network. Here international grant applications should be considered.

Threats:
The team is partially dependent on success in grant applications.

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
This criterion is fulfilled in an excellent manner. The average rating of the selected outputs of the Phase I is 2.25 which can be considered as a very good level, being better than the majority of the evaluated teams. The distribution of quality is excellent since among the sixteen outputs evaluated, 31.3% are in the first decile (Q1*) and 75% in the first quartile (Q1* or Q1). Compared to the field, the production of the EPB team is in the range for the productivity of teams in excellent outputs (per FTE) rated as world-leading as well as world-leading + Internationally excellent.	
H1.2	**Contribution of workers on the outputs reached**
Most of the research studies were conceived, designed, conducted and/or finalized almost exclusively by members of the department.	
H1.3	**Quality of all outputs and results**
The quality of all outputs and results is very good with 7% in the first decile (Q1*), 29% in the first quartile (Q1* or Q1) and 31% in the second quartile. So, 60% of all outputs are within the first/second quartiles.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
The most valuable discoveries and findings of the team are in the fields of plant evolution, in particular horizontal gene transfer (e.g., PNAS, J. Exp. Bot.), polyploid evolution (e.g., New Phytol.) and partial endoreplication (e.g. New Phytol.). The approaches developed by the team are originals, with the use of modern molecular techniques, and based on their outputs the EPB team is a very significant contributor in the field.	

H1.5	Contribution of the participation of the authors in large collaborations
Many outputs are produced in large collaborations of the team members. In most cases the contribution of the team's authors is decisive to the research output.	

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
Many of the outputs have or may have direct and/or indirect societal impact.	
H2.2	**System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team´s activity on proper practice in society in the area of social sciences and humanities**
No information.	
H2.3	**Relation to practice**
The members of the team collaborated in the new edition of the Key to the Flora of the Czech Republic and were responsible for elaboration of some genera.	
H2.4	**Participation in AV21 strategy**
The research of the group has the potential to contribute to AV21 research program 21 “Land save and recovery”. However, no information was provided in the report nor in the presentation.	
H2.5	**Cooperation with regions of the Czech Republic**
No information.	

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the team with similar international and national institutes
The team clearly appears as an international leader in different fields of plant evolution: particular horizontal gene transfer, polyploid evolution and partial endoreplication.	
D1.2	**Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation**
The broad international cooperation (South Africa, Canada, USA, Germany, Switzerland, Singapore, Russia, etc.) is clearly one of the main strengths of the team. The team collaborates with some world leading groups. This should contribute to continue the marked improvement observed in terms of the quality of the team's publications compared to the last evaluation.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
The members of the team are very active across the range of scientifically relevant activities such as conference and workshop organization, chairman of society, panel evaluation member, international scientific journal board member and reviewer.	

The members of the team are regularly invited to give seminars or lectures. Awards for both established and junior researchers have also been won by members of this team.

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
Being founded only in 2017, the team took over some tasks previously assigned to the Department of Taxonomy and Flow Cytometry and most of those that were associated with the Department of Genetic Ecology.	
D2.2	**Assessment of the previous research objectives and their achievement**
Despite some drawbacks, the team has achieved with success the previously stated research objectives and have produced excellent quality outputs.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
The team has fulfilled the recommendations since the results were published in higher-ranked journals as compared to the previously evaluated period.	
D2.4	**Success in receiving grants**
The team was very successful in receiving national grants, in particular from the Czech Science Foundation. By keeping this trend, the team recognizes that they should be able to maintain and further develop their research activities. However, it could be interesting to further diversify the project submissions, and in particular to consider international calls for projects (e.g. ERC) in order to consolidate the international position of the team.	
D2.5	**Adequacy of instrumental equipment**
According to the provided information, the instrumental equipment seems appropriate. The extensive use of NGS may generate significant needs in the future for HPC, data management and analysis.	
D2.6	**Effectiveness of management**
Regular evaluation by the Evaluation Committee, annual evaluating and motivating interview with their immediate superior for technicians and supporting staff are mentioned and are effective. Young researchers are encouraged to travel for research stays abroad.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
The team has a balanced age structure that promises long-lasting research in the field, with the majority of the researchers below the age of 45.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
Good gender balance of researchers. Few foreign researchers.	
D2.9	**Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.**
No information.	

Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	Scope of cooperation with universities on national and international level
Collaborations with Czech universities on the personal basis (Czech University of Life Sciences, Palacký University, University of South Bohemia, Stellenbosch University).	
D3.2	**Effectiveness of joint research centres**
No information.	
D3.3	**Success rate in supervision of PhD students**
The number of PhD students is appropriate.	
D3.4	**Participation of PhD students in the outputs**
PhD students figure regularly as first authors of publications covering the topics of their doctoral theses as well as co-authors of other publications of the team.	
D3.5	**Participation of the team in master or bachelor studies**
The participation is in the form of some lectures given and supervision of master and bachelor students.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Cooperation is limited to the lectures at bachelor, master and doctoral levels as well supervision of students. This is an area that could be improved further.	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
The team has been active in the popularization of their research with lectures for the professional and general public, with participation in several radio and TV programs, by writing articles for popular science journals and by participating regularly in summer courses of biology for high-school students. The team members also participated in the Science Fair 2019. This effort should be continued or even intensified in the future.	
D4.2	**Publishing activities and its quality**
The publishing quality is correct. The team members wrote 17 articles for popular science journals (including Živa, Botanika, Přírodovědci.cz, Roezliana).	
D4.3	**Participation in professional organisations in the area of research and development**
The team members have provided lectures for the professional.	

Other comments of the commission:
The team is recognized at the international level for its research in its field. The quality of the outputs is excellent and was improved compared to the previous evaluation. The team should continue in that direction. The broad international cooperation (South Africa, Canada, USA, Germany, Switzerland, Singapore, Russia, etc.) is also a strength of the team. The team collaborate with some world leading groups, and should take advantage of this strength to consider international calls for projects (e.g. ERC) in order to further consolidate the international position of the team.
Cooperation with universities is limited to the lectures at bachelor, master and doctoral levels as well supervision of students. This is an area that could be improved further. The team has been active in the popularization. This effort must be continued or even amplified in the future. A particular effort must be provided to improve the societal impact of the research work of the team.

3. Department of Population Ecology

Strengths:
The team is active in the research field of adaptation of species to changing climates by exploring (epi-)genetic processes in natural populations, their temporal and spatial variation and interactions with other organisms and the environment. This is an important and timely topic. The team is benefiting from collaborations with other groups nationally and internationally and through this approach they work on a number of interesting topics. They publish their results in well-recognised international journals. Their publication record is very good. The team receives adequate funding and the research takes profit from an established network of international collaborators that can and has contributed to higher quality outputs.

Weaknesses:
More effort is required to elaborate, strengthen and publicize the societal relevance of the team's research

Opportunities:
The young age profile of the team brings opportunities to broaden the research field and adjust it to current challenges. Although the progress in molecular research has been slow, it could provide a future opportunity to increase competitiveness. The visibility of the team should be used to increase the engagement in broad international cooperation.

Threats:
The team operates on a large number of topics in parallel. This poses a potential threat of diluting the research identity of the team.

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
The distribution of quality of submitted outputs based on bibliometric parameters is excellent with 41% of outputs in 1* and more than 95% of outputs in 1* or 1 quartile. The distribution of quality of submitted outputs based on Phase I is also very good with almost 60% of outputs in the category of "World Leading" or "World Leading+Internationally Excellent". Also when compared to the field, the team produces World Leading+Internationally excellent outputs	
H1.2	**Contribution of workers on the outputs reached**
Researchers of the team were corresponding authors in 16 out of 22 evaluated outputs (72%); in 41% out of the submitted outputs evaluated as World-Leading or World-Leading + Internationally the corresponding author was from the team. The average rating of the team was slightly above the average rate of the field and the same was the case for $FC_{1,2}$/FTE and $N_{RP,1,2}$/FTE	
H1.3	**Quality of all outputs and results**
The distribution of quality of outputs based on bibliometric parameters is very good, with 40% of outputs in 1*and 1st quartile and more than 65% of all outputs are within the 1*-2 quartiles. The team is led by Zuzana Münzbergová who has a very high reputation and her papers receive increasing numbers of recitations and attention (google scholar).	

H1.4	The most valuable discoveries and findings in the fields, their importance for the field
The most valuable outputs in the fields of ecology and plant sciences included publication in prestigious journals. Outputs in the fields of evolutionary biology, forestry and genetics were not submitted for evaluation. The quality of research in these later fields should be increased in the future.	
H1.5	**Contribution of the participation of the authors in large collaborations**
Half of the submitted output was the outcome of international collaboration and in most of them the corresponding author was from the team. The output that was evaluated from the top two categories was predominately from national or international collaboration. Outputs generated from the international collaborations were of very high quality. Thus, such collaborations have to be supported and help to increase the visibility of the team.	

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
It seems that many of the outputs have (or could potentially have) direct and indirect societal relevance however more effort is required to elaborate and strengthen such relevance. Right now, the report particularly elaborates on the importance of such research in time of global change and in conservation biology.	
H2.2	**System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team´s activity on proper practice in society in the area of social sciences and humanities**
No information	
H2.3	**Relation to practice**
The team carries out research related to practice mainly through the LIFE for Minuartia programme (2016-2020) but also through national collaborations with conservation agencies, national parks and protected areas. The activities of the team in this sector are of significant importance.	
H2.4	**Participation in AV21 strategy**
The research of the team has the potential to contribute to research program 21. Land save and recovery. However, this is not stated in the report.	
H2.5	**Cooperation with regions of the Czech Republic**
No information	

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the team with similar international and national institutes
The team is internationally recognized as witnessed by collaboration with the Max-Planck Society in Germany, the Gregor Mendel Institute in Austria, the European Training Network EpiDiverse, interactions with the Chinese Academy of Forestry or Yale University.	

D1.2	Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation
The group participates in one Marie Skłodowska-Curie Innovative Training Network and one observation network. Members of the team have established collaborations with universities and research institutes mainly across Europe. Engagement in broad international cooperation should be encouraged further. Nationally, the team collaborates with Institute of Experimental Botany of the CAS and the Department of Botany in Charles University.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
The members of the team are very active across the whole range of relevant scientific activities including panellist in grant agencies, editors in journals, and organisers of conferences and workshops. They have also given talks as invited lectures at national but also international research centres.	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
The team continues its research in important science fields and presents a successful track record. It is important to note that they also invest in new areas. Thus, the overall direction is well in line with the perspective of the planned research.	
D2.2	**Assessment of the previous research objectives and their achievement**
The team has achieved the previously stated research objectives and has produced outputs of very good quality. Progress in molecular research is somehow slow but on the right trajectory.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
The team has implemented the recommendations from the past evaluation.	
D2.4	**Success in receiving grants**
The team has been very successful in receiving grants including funding from EC.	
D2.5	**Adequacy of instrumental equipment**
The team is adequately equipped with instruments.	
D2.6	**Effectiveness of management**
Management seems effective although no much information is provided.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
The team is relatively young with the majority of members below the age of 54. The team has made good efforts to attract excellent scientists from abroad despite numerous constrains. Gender balance seems satisfactory although no much information is provided.	

D2.8	Creating work-life balance conditions, assessment of approach towards possible gender issues
No information provided.	
D2.9	**Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.**
No information provided.	

Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	Scope of cooperation with universities on national and international level
The team is actively collaborating with national universities and mainly with the Charles University.	
D3.2	**Effectiveness of joint research centres**
No involvement in joint research centres. Much collaborative research with universities relies on the basis of member of the team holding positions there and no formal agreements in place.	
D3.3	**Success rate in supervision of PhD students**
The number of PhD students has increased but remains low.	
D3.4	**Participation of PhD students in the outputs**
23% of papers involved at least one PhD student, with 12% of the papers having a PhD student as the first author.	
D3.5	**Participation of the team in master or bachelor studies**
The team provides opportunities for master and bachelor students of Czech and foreign institution to work with them.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Members of the team has been very active in providing lectures and seminars and co-supervising PhD students.	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
The outreach activities are very good, with participation in the Science Fair, Week of Science and Technology, Biological Olympiad, TV and radio. The group has hosted several secondary-school students within the Open Science project. Moreover, it has published 10 articles popularising journals including the most prestigious ones in the CR and has presented research on TV and radio (8 presentations).	

D4.2	Publishing activities and its quality
Published 10 articles popularising journals.	
D4.3	**Participation in professional organisations in the area of research and development**
No information provided.	

Other comments of the commission:

4. Department of Invasion Ecology

Strengths:
The team is clearly an international leader in biological invasions. The group has established excellent contacts with world leading institutions across the world. The team has a very strong publication record of excellent quality outputs and includes highly cited scientists. Although the team publishes less than other teams in the institution, the number of World Leading outputs is significantly higher. The international collaboration has increased the quality of the outputs. The team is active in knowledge transfer into practise and policy at national, EU and international level.

Weaknesses:
The team has a low number of PhD students according to the information provided in the team's report.

Opportunities:
The team has access to extensive databases that has already led and could continue leading to excellent publications in the future as well.

Threats:
The team seems to be composed predominately of young researches and a small number of well-established senior researchers. There is a gap between these two age/seniority groups that can pose future challenges.

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
The distribution of quality of submitted outputs based on bibliometric parameters is excellent with 50% of outputs in 1* and more than 86% of outputs in 1* or 1 quartile. The distribution of quality of submitted outputs based on Phase I is also very good with 41% as World Leading and 68% of outputs as World Leading+Internationally excellent. Compared to the field, the team produced less outputs but significantly higher number of World-Leading and World-Leading+Internationally excellent outputs. In other words, the team seems to focus more on quality than quantity.	
H1.2	**Contribution of workers on the outputs reached**
Researchers of the team were corresponding authors in 9 out of 22 evaluated outputs (41%); 4 out of these 9 outputs were evaluated as World-Leading or World-Leading + Internationally Most of the team's outputs have been the outcome of international collaboration. Although this publication strategy may have reduced the number of total outputs and the number of outputs with a corresponding author from the team, it has paid off with an increase in the number of World-Leading publications.	
H1.3	**Quality of all outputs and results**
The distribution of quality of outputs based on bibliometric parameters is very good, with almost 18% of outputs in 1*, 20% on 1st quartile and 19% in the second quartile. In other words, 56% of all outputs are within the 1*-2 quartile.	

H1.4	The most valuable discoveries and findings in the fields, their importance for the field
The valuable outputs are in the field of ecology and biodiversity conservation with publications in prestigious journals.	
H1.5	**Contribution of the participation of the authors in large collaborations**
Most of submitted output was produced within large international collaboration and in almost half of them the corresponding author was from the team. The participation in large international consortia has increased the quality of the outputs.	

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
The team has developed Environmental Impact Classification for Alien Taxa (EICAT), a standardized method to evaluate the magnitudes of environmental impacts. Members of the team have been the lead authors for two chapters related to invasions as part of IPBES and have participated in an EU working group and a scientific forum on invasive species.	
H2.2	**System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team´s activity on proper practice in society in the area of social sciences and humanities**
Based on the research results of the team, a book is in preparation to highlight different ways of studying biological invasions, in order to fill the gap in exploring novel options for studying the societal and economic dimensions of invasions.	
H2.3	**Relation to practice**
Parts of the team's research have been used at national and international level to enhance the monitoring of invasive species.	
H2.4	**Participation in AV21 strategy**
The research of the group has the potential to contribute to research program 21 Land save and recovery. However, no information was provided in the report or the presentation.	
H2.5	**Cooperation with regions of the Czech Republic**
No information The project "Biological characteristics and sustainable management of Ambrosia artemisiifolia in Europe" (LD15157, Ministry of Education, Youth and Sports of the Czech Republic) deals with the distribution of this allergenic species in the Czech Republic and underlying factors, as well as the performance of potential native competitors and the effect of the competitors on ragweed performance. The project DarkDivNet is a global network to explore the dark diversity of plant communities at about 160 sites sampled in two areas in Czech Republic to capture the regional species pool. Based on the report of the team, a catalogue of the alien plants of the Czech Republic will be released in 2022.	

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the team with similar international and national institutes
The team is clearly an international leader in biological invasions.	
D1.2	**Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation**
One of the main strengths of the group is that most of the research takes place within broad international cooperation. The group collaborates with world leaders in contemporary invasion science. As a result of such collaboration, the team has participated and often led in numerous papers in prestigious high- profile journals.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
The members of the group are very active across the whole range of relevant scientific activities including editor in journals, and organisers of conferences and workshops. They have also given talks as invited lectures at international research centres / organisations.	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
The group has continued its research on fields that have a successful track record. The level of international collaboration has remained excellent.	
D2.2	**Assessment of the previous research objectives and their achievement**
The team has achieved the previously stated research objectives and has produced outputs of excellent quality.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
The team has strengthened even further the contribution of its excellent research to help define policy for conservation and species introductions.	
D2.4	**Success in receiving grants**
The team was very successful in receiving grants including EC funding.	
D2.5	**Adequacy of instrumental equipment**
Good.	
D2.6	**Effectiveness of management**
The management of the team at the department level follows individual needs and demands (access to educational courses, participation in the projects, travel to conferences). Young researchers are encouraged to travel for research stays abroad. Since 2019, regular interviews with team members including technicians have started. As mentioned the most important aspect of the leadership of team is to provide researchers with scientific freedom (i.e. let them choose their themes along the lines of team's long-term scientific mission, and integrate these interests into ongoing projects, or support the grant application of their projects).	

D2.7	Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth
A healthy age structure of the group with the majority of researchers below the age of 45 with ample scientific freedom to pursue their research but also closely linked with existing strengths in the group. Good gender balance of researchers. The team encourages the recruitment of foreign workers. There is however, an age "gap" between 50-60 which may create problems in the future.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
No information.	
D2.9	**Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.**
No information.	

Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	Scope of cooperation with universities on national and international level
Collaborations with Czech universities occurs on the personal basis.	
D3.2	**Effectiveness of joint research centres**
Effective and highly productive official collaboration occurs with DST-NRF Centre of Excellence for Invasion Biology (C·I·B), Stellenbosch University.	
D3.3	**Success rate in supervision of PhD students**
The number of PhD students has remained low.	
D3.4	**Participation of PhD students in the outputs**
PhD students have participated in 15% of outputs. This is an area of potential future improvement. It is important to note though that some of the papers that PhD students participated were published in prestigious journals.	
D3.5	**Participation of the team in master or bachelor studies**
None apart from providing some lectures.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Members of the team have contributed to bachelor and master level teaching but the level of engagement is low. The same applies to PhD students. This is an area that could be improved further.	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
The group has been very active in participated in the popularization of their research through radio broadcasts, TV programmes and public lectures.	
D4.2	**Publishing activities and its quality**
The team has been very active producing popularization articles, and popular books.	
D4.3	**Participation in professional organisations in the area of research and development**
No information.	

Other comments of the commission:

5. GIS and Remote Sensing

Strengths:
This group is composed of a young and dynamic team. The department has recently evolved from a service function, becoming established as an independent research group. It has already developed a strong viable portfolio of work. The team is engaged in a convincing network of international collaborators that can and has contributed to higher quality outputs.

Weaknesses:
The relatively small size of the group inevitably means that it may be vulnerable to loss of key individuals and is to some extent constrained by the expertise that it already contains.

Opportunities:
The skill and expertise of the group have placed it in a good position to capitalise on the opportunities that arise from monitoring and quantifying the impact on climate change and its effect on vegetation dynamics.

Threats:
The scientific themes in which they work places them in apparent competition with teams within the Global Change Research Institute of CAS. They are however much better connected to the underlying biology. It is important that liaison between this group (and ideally the IAB institute) and comparable grouping within the GCRI takes place to resolve issues of competition and identify opportunities to work together.

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
For such a young department it should be noted that they have made a significant contribution to an important paper in Science. The quality of their publications is also on a very good trajectory given their evolution from a service role. Their publications all have a clear role and value in terms of their societal impact. The distribution of quality of submitted outputs based on bibliometric parameters is very good, with almost 36% of output in 1* and 81% of outputs on 1* or 1 quartile. The distribution of quality of submitted outputs based on Phase I is also good with 63% of the outputs evaluated as World Leading or World Leading + Internationally Excellent.	
H1.2	**Contribution of workers on the outputs reached**
Department staff has made a significant contribution to all the outputs listed and played a major role in their higher impact publications. They were corresponding authors in 7 out of the11 evaluated outputs.	
H1.3	**Quality of all outputs and results**
Given their recent establishment, the quality and productivity of their output is very good.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
The Science paper which demonstrates the importance of microclimate in the response of the forest plant community to climate change is an important finding which contributes both to the understanding of the response to climate change and the development of approaches to monitoring significant changes which are likely to affect not only forests but other ecosystems.	

H1.5	Contribution of the participation of the authors in large collaborations
The authors have played important roles in their higher impact collaborative publications. All the submitted output was the outcome of national or international collaboration. The outputs that were evaluated as in the top category were predominately from international collaboration. Thus, such collaborations have to be encouraged.	

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
The work from this department has an important role to play in terms of the translation of scientific studies on the impacts of climate change into policy recommendations and political decision making. They have the potential to make a significant contribution to the ability of the Czech Republic to mitigate the impact of climate change on forest ecosystems and invasive plant species. This should have been communicated more clearly in the report.	
H2.2	**System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team´s activity on proper practice in society in the area of social sciences and humanities**
The work of the group on the predicting the potential forest fires and the trajectory of invasive species is of great potential value. Their work on the utilisation of citizen science is both of direct value and represents a valuable utilisation of a ‘person power’ resource.	
H2.3	**Relation to practice**
The role of the department in the creation of the PLADIAS database is important in delivering access to the Czech Flora for both scientist and members of the public. Their role in the development of a widely adopted microclimate sensor is also a valuable contribution as well as being of direct value to their own work.	
H2.4	**Participation in AV21 strategy**
A member of the department coordinates the “Biodiversity in Time and Space” Strategy AV21 research activity.	
H2.5	**Cooperation with regions of the Czech Republic**
As detailed below, members of the department were active participants in PLADIAS which is a joint excellence research project on plant diversity in the Czech Republic and research on plant diversity, distribution and dynamics.	

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the team with similar international and national institutes
This is a small team built from early career researchers but none the less compares favourably with comparable groups and similar components of larger teams.	

D1.2	Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation
They have made good use of national and international workshops and networking meetings to foster the development of research cooperation, for example by using COST and INTERREG projects. This has enabled them to create a valuable portfolio of national and international collaborations which are of particular value given their area of research focus.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
They have organised meetings on geostatistics and microclimate sensing both arising directly out of their research experience. The members of the group are active across a range of relevant scientific activities including, editorial boards in journals, and organisers of conferences and workshops.	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
They have further developed work in all three of their planned research activities through this assessment period.	
D2.2	**Assessment of the previous research objectives and their achievement**
They have made significant progress in all areas which has both resulted in publications and laid the foundation for future progress.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
This group was assessed within another department and there was no specific recommendation for them to respond to.	
D2.4	**Success in receiving grants**
There is not good evidence of attracting significant grant income. However, they have been active in seeking support for networking projects e.g., EU COST applications. This is an area which would benefit from mentoring of the group leaders in the department by more senior staff from other departments in the institute.	
D2.5	**Adequacy of instrumental equipment**
There are no problems here. Indeed, they have expertise in the design and manufacturing of sensors.	
D2.6	**Effectiveness of management**
The group is well-managed with regular meetings between the head of department and staff of all levels.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
The group is working hard to keep and attract Ph.D. students and Post Docs. They had an incredibly positive experience hosting a foreign post doc and are working to attract further competent visitors and students. This is to be encouraged.	

D2.8	Creating work-life balance conditions, assessment of approach towards possible gender issues
This is being addressed through the mentoring of junior staff.	
D2.9	**Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.**
Not discussed.	

Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	Scope of cooperation with universities on national and international level
A member of the department has participated in a ERC consolidator project in Ghent as well as other projects with universities in Belgium, the Netherlands, Norway, Slovakia and the UK.	
D3.2	**Effectiveness of joint research centres**
Between 2014 and 2018, members of the department were active participants in PLADIAS which is a joint excellence research project between the Institute of Botany, Masaryk University, and the University of South Bohemia. This has resulted in both the creation of an online information system for access to information on plant diversity in the Czech Republic and research on plant diversity, distribution and dynamics.	
D3.3	**Success rate in supervision of PhD students**
Six members of staff completed their Ph.D. in the assessment period and a further 4 PhD students are members of the department.	
D3.4	**Participation of PhD students in the outputs**
Ph.D. students made major or senior author contributions to 6 papers in the assessment period.	
D3.5	**Participation of the team in master or bachelor studies**
Members of the team have made significant contributions to both undergraduate and taught postgraduate courses at 3 different Czech Universities.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Several members of the department provide both masters and bachelor level lectures to university courses.	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Members of the department have been active in contributing articles to popular science journals and have given TV interviews based on their work on both pest outbreaks and the spread of invasive plants. They also organised and led a ‘Science Trek through Pruhonice	

Park'. A particular feature of their work in this area is the promotion of Citizen Science using smartphone apps and its contribution in providing ground truth information to calibrate their work utilising UAVs to monitor invasive species.	
D4.2	**Publishing activities and its quality**
The team has published articles in popularising journals and is involved in the editorial board of one of them.	
D4.3	**Participation in professional organisations in the area of research and development**
Members of the department are on the editorial board of several journals and have played a significant role in the development of the Platform for the Landscape.	

Other comments: n/a

6. Department of Functional Ecology

Strengths:
This is a highly international team with active international cooperation. Overall the team shows a very good level of publishing. The team operates on a large number of topics, uses diverse in situ facilities (chemical, anatomical and tree-ring laboratory, greenhouses). The age profile of the team is healthy.

Weaknesses:
The team supervises a fairly low number of PhD students. The self-reported lack of space, as some of the buildings are reported as old and unsatisfactory, limits the development of the team.

Opportunities:
The team is able to combine and utilize several methodological approaches (anatomy, morphology, physiology) in the same projects and this ability strengthens the significance of the work and should be exploited further.

Threats:
The team is partially dependent on its in-situ facilities, and on success in grant applications. Discontinuation of funding would threaten the success of the research.

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
22 publications from a total output of 251 between 2015 and 2019 were evaluated in the first phase. Average rating is 2,09 that can be considered of excellent level, being far better than average of the teams evaluated. The distribution of quality of submitted outputs based on Phase I is very good with 18,1% of outputs in the first category and 72,7% of outputs in the first 2 categories. Compared to the field, the team produces less outputs, but more of WL (1) and WL + Internationally excellent (1+2) outputs.	
H1.2	**Contribution of workers on the outputs reached**
Fractional count indicates that contribution of workers in world leading outputs is about the average of the field while data on world-leading plus internationally excellent level outputs indicate higher than average total contribution. The researchers from the team contribute a substantial part to the achieved excellent results and in most cases they appear as corresponding authors ($FC_{1,2}$/FTE: 0,4, $N_{RP,12}$/FTE: 0,77).	
H1.3	**Quality of all outputs and results**
Outputs and quality of results are of very good level. The distribution of quality of total outputs by bibliometrics is very good, with 36,3% of outputs in 1* or 1 quartile, and 63,3% of outputs in the quartile 1* - 2.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
Main findings of different study areas include, for example: -Spread by clonal growth is independent of the spread realized by the dispersal ability of seeds, which is often ignored or treated erroneously. -Clonal plants prevail in wetlands and alpine zone but are rare on arable land.	

-Clonality seem to enable the successful establishment of polyploids.

-Positive role of disturbance in the evolution of root sprouting plants is supported: disturbance frequency and severity play a large role in structuring flora and vegetation. Severe disturbance can cause slight postponement of senescence in potentially monocarpic herbs.

-A significant increase in tropical cyclone activity in the northern latitudes over the past century is demonstrated. Combination of winter frost, summer floods, and strong summer diurnal temperature fluctuations control annual and intra-annual growth dynamics.

-At lower elevations, trees are limited by water deficit, whereas direct temperature limitations concern the higher elevations.

-Alpine plants have adapted to harsh conditions and how they responded to ongoing climate change. Alpine plant responses to recent climate warming are modulated by biotic interactions, abiotic constraints and anatomical, physiological and morphological trait adaptations. Rapid warming in the Himalayas increases plants upper distributional limits, vegetation cover and abundance of species adapted to a warmer climate. Alpine tree line in the arid Himalayas is determined by sink (growth) and not source (photosynthesis) limitation and that climate warming may push tree limit upward via enhanced growth. We also discovered that alpine cushion plants, dominant pioneers of subnival zones, are threatened by warming and expansion of competitively strong graminoids and herbaceous perennials from alpine grasslands.

-Potassium alleviates the toxic effect of calcium in acidophilic Sphagnum species, while the basophilic (calcium-tolerant) mosses avoid the toxicity thanks to the physiological mechanism at plasmalemma.

-Spontaneous succession directs towards the natural potential vegetation resulting in more diverse plant communities than technical reclamation. The rate of successfully ongoing succession increases with latitude. The potential of spontaneous succession to restore the ecosystems is, therefore, higher in temperate regions than in e.g. tropical regions, where large human intervention in ecosystem restoration will be needed.

-Aboveground competition for light shifts species composition of the understory, while belowground composition may be essential for understory productivity.

-In the early successional stages, earthworms create persistent soil structures and affect plants through a number of other more direct effects, e.g. nutrient mobilisation, but in late successional stages soil structures are already created and earthworms affect plants predominantly only via these direct effects. Competitively strong species profit from earthworm presence, which fastens species replacement during the succession.

H1.5	Contribution of the participation of the authors in large collaborations

Many of the outputs are product in large collaboration efforts.

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission

Many of the outputs have direct and indirect societal relevance.

H2.2	System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team´s activity on proper practice in society in the area of social sciences and humanities

N/A.

H2.3	Relation to practice
Research has provided applicable practical information for areas like conservation.	
H2.4	**Participation in AV21 strategy**
The research of the group has the potential to contribute to research program 21 Land save and recovery.	
H2.5	**Cooperation with regions of the Czech Republic**
No cooperation was enlisted.	

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the team with similar international and national institutes
This is internationally recognized very strong team.	
D1.2	**Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation**
All the research groups of the team do have active national and international cooperation activities.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
Team has been actively involved in boards of relevant scientific societies, and in organizing scientific meetings.	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
Direction is quite well in line with the perspective of the planned research.	
D2.2	**Assessment of the previous research objectives and their achievement**
High number of outputs was produced.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
There has been a significant increase in the number of publications in Q1 journals such as Trends in Ecology and Evolution, PNAS, Functional Ecology, Journal of Ecology, New Phytologist, Ecography and Trends in Plant Science. Team significantly expanded the studied set of plant functional traits towards the cellular and molecular levels by focusing on the anatomical adaptation of plants in herbs and trees, analysed in the newly established Anatomical Laboratory of the department.	
D2.4	**Success in receiving grants**
2,594 M€, equalling 0,154M € per FTE. This is a very good figure.	
D2.5	**Adequacy of instrumental equipment**

Instrumental equipment is adequate and effective.	
D2.6	**Effectiveness of management**
Management is effective.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
Age structure is balanced. Each member of the department is encouraged to increase its expertise and the budget of the department is used to support the participation of the members in international workshops and specialised training courses.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
No information provided.	
D2.9	**Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.**
No information provided.	

Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	**Scope of cooperation with universities on national and international level**
Plenty of cooperation with universities both on national and international level.	
D3.2	**Effectiveness of joint research centres**
N/A.	
D3.3	**Success rate in supervision of PhD students**
Ten doctoral students are enrolled, and in total three doctoral theses were defended, but the “Personal structure of team“ sheet indicates low proportion of FTE of PhD students.	
D3.4	**Participation of PhD students in the outputs**
Several PhD students were contributed significantly to outputs.	
D3.5	**Participation of the team in master or bachelor studies**
Teaching courses at the universities.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Team has active teaching cooperation with universities (mostly with University of South Bohemia), including several Master and Doctoral level courses.	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Research popularisation has been active and sufficient, including annual open days in the collection of aquatic and wetland plants, guided tours and visits for the general public, guided field trips for schools and the general public, practical trainings for secondary school students and university students, seminars for teachers on wetland plants, lectures for the general public, exhibitions and several articles in newspapers and popular science magazines.	
D4.2	**Publishing activities and its quality**
Several articles in newspapers and popular science magazines were produced.	
D4.3	**Participation in professional organisations in the area of research and development**
No information provided.	

Other comments of the commission:

7. Department of Vegetation Ecology & Laboratory of Paleoecology

Strengths:
The team is research active in the fields of spatiotemporal patterns in terrestrial (predominately) plant communities and long-term interactions with human societies. It is one of the few teams that carries out interdisciplinary research that crosses natural and social science boundaries. The team carries out both basic and applied research. The team has a long tradition of research in the field and uses existing infrastructure for long-term monitoring projects. The team has established a good network of international collaborators that could and has contributed to higher quality outputs. The team has a very good publication record

Weaknesses:
More effort is required to increase the number of PhD students. Also, more international funding is recommended

Opportunities:
The interdisciplinary research of the team can lead to societal relevant outputs. The young age profile of the team brings opportunities to broaden the research field and adjust it to current challenges. The team has good future plans and ideas of areas to expand into which are appropriate and likely to be fruitful. Consider increasing the number of research funding, especially from international sources.

Threats:
The low number of foreign researchers does not enable the exchange of knowledge and experience

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
The distribution of quality of submitted outputs based on bibliometric parameters is excellent with 53% of outputs in 1* and all of outputs in 1* or 1 quartile. The distribution of quality of submitted outputs based on Phase I is also very good with almost 82% of outputs as World Leading or World Leading+Internationally excellent. Compared to the Field, the team produce less output but almost the same quantity of World Leading and World Leading+Internationally excellent outputs	
H1.2	**Contribution of workers on the outputs reached**
Researchers of the team were corresponding authors in 7 out of 17 evaluated outputs (41%); in 36% of the submitted outputs evaluated as World-Leading or World-Leading + Internationally the corresponding author was from the team.	
H1.3	**Quality of all outputs and results**
The distribution of quality of outputs based on bibliometric parameters is relatively good, with 22% of outputs in 1*and 1st quartile and more than 54% of all outputs are within the 1*-2 quartiles	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
Most of the outputs are in the field of plant sciences but none of these outputs were submitted for evaluation; the quality of research outputs in this field needs improvement. Best performing outputs were in the fields of forestry, physical geography and geosciences	

H1.5	Contribution of the participation of the authors in large collaborations
More than half of the submitted outputs were the outcome of international collaboration and in many of them the corresponding author was from the team. The outputs that were evaluated as in top two categories were predominately from national or international collaboration. Outputs generated with international collaborations were evaluated as of better quality. Thus, such collaborations have to be supported	

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
It seems that many of the outputs have (or could potentially have) direct and indirect societal relevance however more effort is required to elaborate and strengthen such relevance.	
H2.2	**System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team´s activity on proper practice in society in the area of social sciences and humanities**
The team is active on transferring knowledge on biodiversity changes into ecosystem management mainly through jointly applied research projects with ministries and NGOs	
H2.3	**Relation to practice**
As mentioned in section H2.1, part of the team's research focuses on ecosystem management and abandonment and reintroduction of traditional management	
H2.4	**Participation in AV21 strategy**
The research of the team has the potential to contribute to research program 21 Land save and recovery. However, this is not stated in the report	
H2.5	**Cooperation with regions of the Czech Republic**
No information provided	

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the team with similar international and national institutes
This is an internationally recognized team with very long tradition on vegetation ecology	
D1.2	**Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation**
The group is involved in four collaborations, 3 international ones, and 1 national. The international collaborations have strengthened the publication quality and help expand the research into new topics such as fresh water environmental and tropical forest monitoring. The engagement in broad international cooperation should be encouraged further	

D1.3	Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)
The members of the group are active across the whole range of relevant scientific activities including editor in journals, and organisers of conferences and workshops. They have also given talks as invited lectures at national but also international research centres	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
The team continues its research in fields that have a successful track record. Thus, direction is quite well in line with the perspective of the planned research. There has been some transformation in the research directions due to the split of the palaecological group. The age structure of the group is very favourable for 80% of members under 50.	
D2.2	**Assessment of the previous research objectives and their achievement**
Although previous research objectives were slightly uncoordinated and responsive the team has achieved the previously stated research objectives and has produced outputs of very good quality.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
The team has made good efforts to implement the recommendations form the past evaluation and has been very successful. Some challenges still remain though mainly related to attracting excellent scientists from abroad and increasing the number of PhD students	
D2.4	**Success in receiving grants**
The team has been successful in receiving grants including some from EC. This is an area for future improvement	
D2.5	**Adequacy of instrumental equipment**
Adequate instrumental equipment	
D2.6	**Effectiveness of management**
The team has gone through challenging times and restructuring with the split of the paleocological group. However, it seems that the team has managed to pass successfully that challenging period and current management seems effective although no much information is provided	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
It is a relatively young team with the majority of members below the age of 40. This may create potential challenges due to lack of very experienced staff. More efforts are needed to secure long-term funding and encourage foreign workers to join the team. Gender balance seems adequate.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
No information provided	

D2.9	**Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.**
No information provided	

Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	**Scope of cooperation with universities on national and international level**
The team is actively collaborating with several universities and research institutes across Europe and North America. The team has also started a collaboration with the Institutes of Archaeology of the Czech Academy of Sciences in Prague and Brno	
D3.2	**Effectiveness of joint research centres**
There is one joint research centre with the department of Botany and Zoology of Masaryk University (MU) in Brno. However, this is currently operating through informal contacts	
D3.3	**Success rate in supervision of PhD students**
The number of PhD students has remained very low and this is an area for future improvement. The low number of PhD has been mentioned in the past evaluation period and this problem persists	
D3.4	**Participation of PhD students in the outputs**
There has been some contribution of PhD students in the outputs.	
D3.5	**Participation of the team in master or bachelor studies**
Member of the team are active in providing lectures and seminars for master students	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Members of the group are actively cooperating in the form of teaching with the following universities: Masaryk University in Brno, Department of Botany and Zoology Masaryk University in Brno, Department of Environmental Studies Palacký University in Olomouc, Department of Botany Charles University in Prague, Department of Botany	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	**Sufficiency of media strategy and activities in the area of research popularisation**
The group has published articles in popularising journals and they have given radio and TV interviews and they have organised lectures, excursions and scientific fairs .	
D4.2	**Publishing activities and its quality**
The team has published articles in Czech and international popularising journals. During the evaluation period there have been 6 publications in Živa and other in Czech professional journals	

D4.3	Participation in professional organisations in the area of research and development
They participate in solving specific situations of protected areas under the Ministry of the Environment and the Ministry of Agriculture	

Other comments of the commission:

8. Department of Mycorrhizal Symbioses

Strengths:
The team convincingly performs systematic work in a well-defined but relatively narrow scientific field. The team members cover a broad expert knowledge in a range of traditional and cutting-edge methods. It is a respected team within the given professional community with relatively extensive international cooperation.
They successfully obtained Czech funds for basic and applied research projects. Their output includes a sufficient number of publications of medium quality in relation to the size of the team. The team is stabilized and consists of scientific and technical staff in a relatively good age range.

Weaknesses:
International cooperation is not sufficiently supported by grants or other forms of formalization. The output has a relatively low proportion of truly excellent and highly cited publications. The team supervises a low number of PhD student although efforts are being made to strengthen it.

Opportunities:
The expertise should allow for identifying opportunities to establish further national and international cooperation, including interdisciplinary projects, and successful search for other research topics. There exists a good chance for greater recognition within the scientific community and wider popularization of research results and their importance.

Threats:
The team needs to strive more for excellence and recognition in the field, otherwise there is a risk of limiting material and financial support.

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
Thirteen publications from a total output of 97 between 2015 and 2019 were evaluated in the first phase. Eight of them were in the first decile or quartile, 5 in the second quartile. The quality of the publications was 2 (internationally excellent), or 3 (internationally recognized) with the rating 2.69, which is below the average of the evaluated group of biological teams. Most of the evaluated work had a reprint author from the team, but the overall ratio of excellent publications to the number of employees was low ($N_{RP1.2}$ / FTE = 0.27)	
H1.2	**Contribution of workers on the outputs reached**
Researchers of the team were corresponding authors in 12 out of 13 evaluated outputs (92%). The high share of the team's researchers was mainly in average publications, their share in excellent results was lower.	
H1.3	**Quality of all outputs and results**
In the evaluated period, 97 outputs were published, of which 25 (25.7%) in the first decile or quartile, 34 (35%) in the second quartile. This means about 4 publications in the first or second quartile per worker (FTE). The volume of publications in terms of the number of researchers is sufficient, the quality is medium.	

H1.4	The most valuable discoveries and findings in the fields, their importance for the field
Most of the outputs are in the narrow field of mycorrhiza. This brings, on the one hand, the possibility of clearly defined work, and, on the other hand, reduces the possibility of interdisciplinary cooperation and greater recognition. A sufficient number of quality results was achieved in the evaluated period: Biotic factors more important than soil chemistry for structuring root-associated fungal communities during succession. Important seegrass Posidonia oceanica associates with a novel fungal root endophyte. Arbuscular mycorrhizal fungi compete with their host plants for nitrogen. These results are high quality, well documented in publications, but there is a need to further raise the profile of the field within the scientific community.	
H1.5	**Contribution of the participation of the authors in large collaborations**
More than half of the submitted outputs were the outcome of international collaboration and in many of them the corresponding author was from the team. The outputs that were evaluated ranged in the top two categories and were predominately from national or international collaboration. There is no known involvement in a formally established international form of cooperation.	

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
It seems that many of the outputs could potentially have direct and indirect societal relevance and is already being implemented in various aspects but more effort is required to elaborate and strengthen such relevance. However, they have helped, among other activities, the Czech Republic in its efforts to ensure healthy soils, water and nutrient retention in soils and also in establishing the scientific community in Colombia.	
H2.2	**System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team´s activity on proper practice in society in the area of social sciences and humanities**
The members of the department were engaged in applied research with participation with industrial subjects, which brings new possibilities in realization in practice. They also acted as a consultant in various fields of interest.	
H2.3	**Relation to practice**
They realized applied research with 9 academic partners, 6 private companies. They are active in valorisation of waste biomass and valorisation of plants.	
H2.4	**Participation in AV21 strategy**
No information provided	
H2.5	**Cooperation with regions of the Czech Republic**
No information provided	

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the team with similar international and national institutes
The stabilized team is known and recognized in a close community of international experts dealing with similar issues of mycorrhizal research.	
D1.2	**Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation**
The team has one more extensive cooperation at the national level (MBU Prague) and several partial ones. There are a number of international cooperation at the level of contacts and joint publications. However, there are few joint international grants only.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
The members of the group were active in organization of two international scientific meetings. They gave two invited lectures during the period and obtained prizes for young scientists (2x P. Kohout).	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
The team is well conceived with a quality staff and a clear line of research. It continues with the necessary research and, therefore, is quite well in line with the perspective of the planned research. It would be desirable to further promote its activities or expand to other interdisciplinary topics.	
D2.2	**Assessment of the previous research objectives and their achievement**
The team achieved the previously set research goals and brought outputs in sufficient volume with mostly medium quality.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
The team is aware of its limits and reacted well to the recommendations from the previous evaluation period. They have achieved a partial improvement in the quality of publications as well as the expansion and formalization of international cooperation; the set parameters need to be further increased and improved.	
D2.4	**Success in receiving grants**
The team is successful in obtaining Czech grants and as such is self-sufficient in obtaining funding for scientific work. They also achieved partial success in international cooperation and obtaining funds from international grants. However, these efforts should be further strengthened.	
D2.5	**Adequacy of instrumental equipment**
They have an adequate instrumental equipment and a very well-established range of traditional and cutting-edge methods, ranging from cultivation techniques to advanced molecular methods for the characterization of fungal communities in environmental samples.	
D2.6	**Effectiveness of management**

The group is stabilized with an experienced scientist at the head. Key scientists master a complementary range of methods and activities and are supported by experienced technicians.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
The scientific, professional and methodological level of the team is good. The age structure of the team is also good, with the majority of members (77%) in the group being 30-50 years old.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
No information provided	
D2.9	**Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.**
No information provided	

Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	**Scope of cooperation with universities on national and international level**
Team members participate in teaching only at the national level. The level of involvement in teaching appears sufficient.	
D3.2	**Effectiveness of joint research centres**
They probably are not active in any joint research centre	
D3.3	**Success rate in supervision of PhD students**
The team members supervised 11 PhD students, 6 of whom successfully defended.	
D3.4	**Participation of PhD students in the outputs**
The share of students in the team's research activities was low.	
D3.5	**Participation of the team in master or bachelor studies**
They were active in a number of subjects and courses of teaching of undergraduate students, especially at Charles University in Prague	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
The members of the team (namely J. Albrechtová) participate in the teaching of a number of subjects of the bachelor's and master's programs, especially at Charles University and have been successful in this activity.	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
The popularization and promotion of their field of science could be greater, Nevertheless the group has published some articles in popularising journals. They participate in building of the Czech pavilion EXPO 2020. They hosted eight high-school students (2018 and 2019).	
D4.2	**Publishing activities and its quality**
The team has published articles in Czech professional journals for popularization (Botanika, Vesmír, Živa).	
D4.3	**Participation in professional organisations in the area of research and development**
The scientists of the team are members of the scientific board of the journal Mycorrhiza. Jana Albrechtova was the president of some important European plant associations	

Other comments of the commission:

9. Centre for Phycology

Strengths:
The main areas of strength that the Centre has is in the taxonomy of both cyanobacteria and eukaryotic microalgae and the Culture Collection which it hosts.

Weaknesses:
This is a small group with a relatively weak portfolio of research and there are major issues with regard to recruitment and retention of staff with appropriate skills and experience. The report lists a large set of research activities ranging from six projects in the field of diversity, ecology and taxonomy of cyanobacteria, five projects in the field of diversity, ecology and taxonomy of eukaryotic algae and five projects in the field of biotechnological utilization of algae. This diversification endangers any focus.

Opportunities:
The main opportunity for the group is to improve the information base of and therefore the utility and visibility of its culture collection by sequencing and annotating the majority of accessions. This would give them the opportunity to mine the collection for valuable activities and compounds which would combine well with their expertise in developing culture methods.

Threats:
The major threat to the group comes from the difficulty the IAB has had in recruitment of a group leader for the Centre for Phycology which threatens the viability of the group. The diversity of research projects in the three (broad) fields of interest hampers the development of a discernible strong focus.

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
The Centre for Phycology does not have an impressive record of research publication outputs. They have however made a significant contribution in terms of a series of monographs in their field of work. Their work is not highly cited, although that may reflect the area in which they work rather than simply the quality of their science. The average rating of the team quality was 2.6, which is in the lower range of all teams evaluated by this committee.	
H1.2	**Contribution of workers on the outputs reached**
Members of the centre have made the major contribution to most of their outputs.	
H1.3	**Quality of all outputs and results**
Most of the work can be rated good rather than very good/excellent.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
Their main contribution has been in resolving and improving the basis of cyanobacteria and eukaryotic algal taxonomies.	
H1.5	**Contribution of the participation of the authors in large collaborations**
Their main international collaboration has been in diatom taxonomy and involves both European and American Groups.	

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
The work of the team is of relevance for the development of an understanding of the role of cyanobacteria and eukaryotic algae in algal blooms, the stabilisation of soils and the deterioration of building surfaces. The team also conducts research on the use of algae in biotechnology, however the level of competitiveness in research fields as diverse as carotenoid, fatty acid or exopolysaccharide production is difficult to judge.	
H2.2	**System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team´s activity on proper practice in society in the area of social sciences and humanities**
The main area of impact is on the work of the team with regard to the impact of algae on concrete surfaces such as cooling towers.	
H2.3	**Relation to practice**
The group has patented an algal strain for water purification and a mobile device for the imaging of microorganisms on the surface of materials which has the potential to play a role in the early detection of bio-destruction of materials.	
H2.4	**Participation in AV21 strategy**
Not applicable.	
H2.5	**Cooperation with regions of the Czech Republic**
The team cooperates with several universities and several joint publications arose from these interactions.	

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the team with similar international and national institutes
The small size of the team and the difficulties experienced in recruitment and retention of staff with key skills is typical of many taxonomic groups around the world. Despite their staffing issues the taxonomic roles they play are of significant value.	
D1.2	**Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation**
They have a well-established international collaboration in diatom taxonomy. They also have collaborations that support their polar work with the University of Southern Bohemia and the Charles University in Prague.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
Members of the Centre have organised both national and international level conferences, receive several awards and given invited lectures on a scale that is consistent with the size and reputation of the department.	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
The work they have undertaken in the assessment period is largely in line with the planned activities. The last evaluation panel recommended placing focus on fundamental research as well. This recommendation was implemented.	
D2.2	**Assessment of the previous research objectives and their achievement**
They have made progress in all areas of their planned research and have taken it as far as to publication.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
The group have responded to the previous recommendations in continuing both the fundamental and applied areas of activity.	
D2.4	**Success in receiving grants**
There is nothing reported here	
D2.5	**Adequacy of instrumental equipment**
There are no reported issues here.	
D2.6	**Effectiveness of management**
The group is professionally managed with regular meetings between the head of department and staff of all levels. This is despite the issue around recruitment of a group leader.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
The group has some major problems in this area in that of the 9 staff members only 2 are full time FTEs and they have found it impossible so far to recruit a group leader. Though they have ambitions to recruit both staff and students this seems likely to be extremely difficult unless they can resolve the issue of leadership. They also have a problematic age structure.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
There is no information here but again this is an area which almost certainly is problematic given the lack of leadership.	
D2.9	**Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.**
No information.	

Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	Scope of cooperation with universities on national and international level

Staff from the department are involved in teaching and training courses with Czech Universities.	
D3.2	**Effectiveness of joint research centres**
The group has both teaching and research interaction with the University of Southern Bohemia and the Charles University in Prague.	
D3.3	**Success rate in supervision of PhD students**
There were 7 PhD projects completed in the assessment period.	
D3.4	**Participation of PhD students in the outputs**
PhD students made major (5) or (9) senior author contributions to papers in the assessment period and in addition a further 15 papers had contributions from students from university collaborations.	
D3.5	**Participation of the team in master or bachelor studies**
Nine BSc.-theses and 16 MSc.-theses were defended between 2015 and 2019. This is a very good activity considering the size of the team.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Overall, the pedagogical activity of the team in terms of lectures, seminars and courses and supervision of study theses is very high.	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	**Sufficiency of media strategy and activities in the area of research popularisation**
Members of the centre gave talks on their research in the polar regions and in the Himalayas.	
D4.2	**Publishing activities and its quality**
More than a dozen articles were published in Czech Popular Magazines about cyanobacteria in the Polar Regions and biological soil crusts and their importance in ecosystems.	
D4.3	**Participation in professional organisations in the area of research and development**
Team members had roles in the International Artic Science Committee and served on the editorial board of the Czech Polar Reports.	

Other comments of the commission: none

10. Department of Experimental Phycology and Ecotoxicology

Strengths:
There are concentrated efforts on a selected research area with a high potential for application in practice with excellent research results published in prestigious journals. The team has real and effective application of results in practice. They search for new important topics in environmental toxicology.

Weaknesses:
There are a small number of core researchers in the team, where the loss of one means a significant weakening of the team, and the loss of a leading scientist can mean a loss of the ability to continue the implementation of the work
Transforming the results into a patent does not mean their implementation in practice yet - the group is dependent on other groups for their implementation, including state authorities

Opportunities:
The connection of the team in the Institute of the Academy of Sciences with the University provides an opportunity to attract talented students and is an opportunity to strengthen the team, which should strive to ensure that the best of these students become full members of the team. Cooperation with the Centre of Phycology is offered, which could lead to the strengthening of both teams. It is necessary to further strive for the practical application of scientific results and the implementation of applied patents

Threats:
The loss of a core researcher, especially a team leader, will mean a significant weakening to the overall loss of a scientific group.

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
Four publications from a total output of 17 between 2015 and 2019 were evaluated in the first phase. Three of them were in the first quartile. One of the publications was evaluated as world leading (1), two others as international excellent (2). The average rating of the team was 2,00 which is a high rating above the average in the evaluated biology group.	
H1.2	**Contribution of workers on the outputs reached**
Researchers of the team were corresponding authors in all evaluated outputs. The share of team members in publications was high.	
H1.3	**Quality of all outputs and results**
In the evaluated period, 17 outputs were published, of which 5 (29,4 %) in the first quartile, 2 (11,8 %) in the second quartile. This means about 1,75 publications in the first or second quartile per worker (FTE). The volume of publications in terms of the number of researchers is low but the quality is reasonably high.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
Long term topics are focused on ecotoxicology, limnology, environmental technologies and water resources. During the last period they moved from the study of cyanobacterial water blooms and effects of cyanotoxins on water resources to the topics more related to	

ecotoxicology of nanomaterials, especially nanomaterials for water treatment. The research focused on two main research directions, from which two key publications also emerged:

Application of passive sampling for sensitive time-integrative monitoring of cyanobacterial toxins microcystins in drinking water treatment plants. 2. Toxicity of graphene oxide against algae and cyanobacteria: Nanoblade-morphology-induced mechanical injury and self-protection mechanism.

An important result of the research are also two accepted patents, which prove the success of research work in the transfer of science into practice. However, its implementation will still require a great deal of effort.

H1.5	Contribution of the participation of the authors in large collaborations

During the last 5 years, members of the department participated in the COST action called CYANOCOST - ES1105 - Cyanobacterial blooms and toxins in water resources, where participated 32 countries around the globe.

The group has implemented two other international projects: One research project with partners from Univ. Of Madrid and University of Amsterdam and another one involves overseas partners and focused on student and researcher exchange. International cooperation could be greater given the importance of the issues addressed.

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission

The research group focuses on research in important areas that bring fundamental new knowledge and at the same time are potentially important in practical use. The group actually participates in the transfer of scientific results into practice.

H2.2	System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team´s activity on proper practice in society in the area of social sciences and humanities

In the past, the group participated in the elimination of cyanobacteria from water bodies, the current practical application in the regions is not known.

H2.3	Relation to practice

Team scientists (especially the team leader) work with a number of governmental and non-governmental institutions to implement the results with practical potential. Their participation in the practical implementation in the past was high, the results of the current phase of research are still waiting to be implemented.

H2.4	Participation in AV21 strategy

No information provided

H2.5	Cooperation with regions of the Czech Republic

The team's researchers work with regional authorities to put scientific results into practice in specific situations.

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the team with similar international and national institutes
An internationally recognized team with very tradition on practical use of eradication of cyanobacteria in water bodies. The level of comparable foreign teams is not known, the team should continue to stimulate international cooperation and raising funds from abroad.	
D1.2	**Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation**
The team has close ties to the universities of the Czech Republic, both in terms of teaching and research, especially with the RECETOX team of Masaryk University in Brno. It would be desirable to increase cooperation with thematically similar groups - one with the Centre of Phycology is offered directly in Inst. of Botany. International cooperation is rather marginal, it is desirable to strengthen its role in the group's research.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
The members of the team participate in the management of universities and other institutions in the form of members of scientific boards, the team leader B. Maršálek was an invited speaker of two prestigious international conferences. The team members are also members of the editorial boards of scientific journals.	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
The team continues its research in areas that have had successful results. The direction is therefore quite well in line with the perspective of the planned research. New promising topics include: the potential of graphene oxide in the control of cyanobacteria, explore an effect of nanoparticles on aquatic ecosystems. An important part is also the transfer of acquired scientific knowledge into patent applications.	
D2.2	**Assessment of the previous research objectives and their achievement**
The team achieved previously a set research goals and brought outputs in high quality journals. The added value is the fact that the scientific results are close to practical implementation. The volume of results is low and should be increased.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
The group does not state how it dealt with the recommendations of the previous evaluation period. The group remains vulnerable to its size and relatively low number of scientific outputs.	
D2.4	**Success in receiving grants**
The team is successful in obtaining Czech grants and as such is self-sufficient in obtaining funding for scientific work. They also achieved partial success in international cooperation, but it is not clear whether international cooperation is also supported by international financial resources. However, these efforts should be further strengthened.	

D2.5	Adequacy of instrumental equipment
They have an adequate instrumental equipment and a very well-established range of a set of laboratory methods and models. Part of the work is thus linked to field sampling and their subsequent analysis.	
D2.6	**Effectiveness of management**
Due to the size of the group, the management is relatively simple, the main role is played by the group leader and other scientists are important. Cooperation with universities and leading a large number of students is key.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
As mentioned in previous scientific questions, the group is very compact with a small number of researchers who are simultaneously involved in teaching or other forms of activity at universities. Above all, the position of the group leader is crucial and his loss would probably mean the disappearance of the entire research issue. The partial goal is to employ two educated technicians who would provide continuous care to ecotoxicological and analytical laboratories. The age structure is favourable with most workers under 45. gender ratio of men and women is balanced, but men are in the leading positions.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
See above	
D2.9	**Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.**
No information provided.	

Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	Scope of cooperation with universities on national and international level
Cooperation with Czech universities is very close, most members of the research team are also part-time teachers at the university. Cooperation with foreign universities is not known (probably does not exist).	
D3.2	**Effectiveness of joint research centres**
All key publications are the result of this team without the contribution of other institutions. Cooperation with foreign institutions brings concrete results in the form of joint publications, but their share in the overall scientific result could be higher.	
D3.3	**Success rate in supervision of PhD students**
Teaching students is an integral part of the work of researchers, most of them participate in the teaching of undergraduate students and the preparation of students for final theses. In the past, 6 bachelor's, 13 master's and 6 doctoral (Ph.D.) theses were defended under the leadership of the group.	

D3.4	Participation of PhD students in the outputs
There has been some contribution of PhD students in the outputs.	
D3.5	**Participation of the team in master or bachelor studies**
Researchers are also part-time teachers at universities, especially Masaryk University in Brno.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
The workers of the team participate in the teaching of a number of subjects of the bachelor's and master's programs, especially at Masaryk University at Brno, but also some others.	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
The group is active in promoting the results to the public and explaining the practical applications of its scientific findings. Team members participated in several television and radio broadcasts, and also fairs for the popularization of science, etc.	
D4.2	**Publishing activities and its quality**
The team has published articles in some Czech professional journals	
D4.3	**Participation in professional organisations in the area of research and development**
The researchers from the group are members of the editorial boards of professional journals. The team members gave several invited lectures at scientific conferences.	

Other comments of the commission: n/a

Final report was elaborated by:

Commission 6 - Biological sciences B
Evaluated teams No.: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

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