Assessment Report

Institute of Environmental Sciences (CML)

Peer Review 2014 – 2019

June 2021

Table of contents

Preface

This report presents the findings and recommendations of an international peer review of the Institute of Environmental Sciences (CML) of Leiden University, carried out on March 11 and 12, 2021.

Our peer review committee was appointed by the Board of Leiden University.

The assessment is based on a self-assessment report provided by CML, additional documentation, and two days of online meetings with the staff and PhD candidates of CML. This review report is both prospective and retrospective and contains several recommendations to CML.

As chair, I wish to thank my fellow evaluators for their expert and sincere contributions to the discussions and final findings. The work was not only intense, but also socially agreeable and academically rewarding.

We thank all members of CML, staff and PhD candidates for their open and constructive participation in the review process.

We hope this report marks the start of another period of highly successful research by CML.

June 2021,

Prof. Henrique Pereira
Chair

1. Introduction

1.1 The evaluation

All publicly funded university research in the Netherlands is evaluated at regular intervals in compliance with the national standard evaluation protocol (SEP 2015-2021), as agreed by the Association of Universities in the Netherlands (VSNU), the Netherlands Organisation for Scientific Research (NWO) and the Royal Netherlands Academy of Arts and Sciences (KNAW). The evaluation process, which is applied at the research unit or institute level, consists of a systematic external peer review conducted every six years.

The evaluation system aims to achieve three generic objectives:
- *improvement* in the quality of research through an assessment carried out according to international standards of quality and relevance;
- *improvement* in research management and leadership; and
- *accountability* to the higher management levels of the research organisations, to the funding agencies, government and society at large.

1.2 The assessment procedure

The evaluation procedures followed by the Review Committee were those set out in the NWO/VSNU/KNAW "Standard Evaluation Protocol 2015-2021 for public research organisations".

The review committee was requested to report its findings on the research institute in line with the three main criteria, which should always be reviewed in relation to the institute's mission, especially if this mission restricts the institute to operate only for/within a national scientific community.

The site visit took place online on March 11 and 12, 2021, and comprised a number of components, which can be summarised as follows (see annex 2 for the full programme and the names of participants):
- Start-off committee meeting on Thursday 11 March 2021
- Meetings with CML's management team (MT)
- Meeting with a selection of the scientific staff of CML
- Meetings with three groups of PhD candidates
- Meeting with associate professors
- Meeting with assistant professors
- Meeting with the CML PhD committee

The Peer Review Committee consisted of:
- Prof. Henrique Pereira (chair), iDiv, Leipzig/Halle/Jena, Germany
- Prof. Mark Huijbregts, Radboud University Nijmegen, Netherlands

- Emilia Ingemarsdotter MSc, TU Delft, Netherlands
- Dr. Serenella Sala, EC Joint Research Centre, Ispra, Italy
- Prof. Jens-Christian Svenning, Aarhus University, Denmark

- Dr. Frans van Steijn acted as independent secretary to the committee

1.3 Results of the assessment

This report summarises the findings, conclusions and recommendations of the international peer review of CML. The review covered the period 2014 to 2019. The written and oral information permitted good understanding of the research units. The assessment was rated and weighed according to the rationale explained in annex 1. The conclusions, as given in chapter 3 of this report, following the structure and criteria, which are formulated in the Terms of Reference, annex 2.

1.4 Quality of the information

The information that was made available to the committee consisted of:

- Self-evaluation report of CML, including annexes with factual data
- Short c.v.'s of researchers of CML 11-12 March 2021
- A range of presentations by CML MT, researchers, PhD candidates and the PhD council.
- The Standard Evaluation Protocol 2025 – 2021
- Leiden Protocol for Research Assessments 2015 - 2021
- Terms of Reference for the Assessment Committee
- Program for the online site visit
- Short c.v.'s of the committee members and secretary
- Midterm review CML 2017
- Peer Review Environmental and Sustainability Sciences including SENSE Research School 2014
- Forty Years of Leiden Environmental Sciences; The history of the Leiden Institute of Environmental Sciences (CML) 1978-2018

The committee found the information ample, honest and adequate.

2 Structure, organisation and mission of CML

2.1 Introduction

The Institute of Environmental Sciences (CML) is one of the oldest environmental research institutes of the Netherlands. CML was founded in 1978. Environmental Science is an interdisciplinary field that focusses on how biogeochemical processes are connected to each other on earth, and more specifically how biotic and abiotic resources are cycling naturally, as well used and impacted by human activity. These human impacts are substantial and mankind seeks to make a major transition in the next decades to a more sustainable society.
The science of CML focuses on quantifying the nature and extent of environmental challenges as well as on developing concepts, models and frameworks to come to science-based scenarios for a sustainable future. That includes the development of globally used methods such as Life cycle assessment (LCA), Environmental input output analysis (EIOA) and Material flow analysis (MFA). CML developed instruments to determine impacts of human activities, gaining process-based understanding, developing scenario models and spatial explicit systems, including national environmental monitoring systems such as the Pesticide Atlas. CML aims to have an important impact on biodiversity and circular economy agendas at regional, national, EU and global level.

2.2 Mission of CML

CML aspires to be a global leader in strategic, natural science based research on how to maximize human wellbeing while keeping resource use and emissions of the economic system within planetary limits, safeguarding biodiversity and natural capital. CML's research seeks to support industry, government and other societal actors on technology development, and to shape transitions to sustainability in general. In line with the strategy of Leiden University of research-based education, this research field also is central in CML's key educational programs: the MSc Industrial Ecology, the MSc Governance of Sustainability (GoS), the track Biodiversity and Sustainability in the MSc Biology, and the Minor Sustainable Development.

2.3 Management and organisation

CML is one of the eight research institutes of the Leiden University Faculty of Sciences. CML consists of two research departments: Industrial Ecology (IE) and Environmental Biology (EB), and a support unit. The Scientific Director of CML is also head of the department of Industrial Ecology. The head of the department of Environmental Biology is also education director of the MSc Governance of Sustainability. CML's management team further consists of an institute

manager—also head of the support unit—and the education director of the MSc Industrial Ecology.

In Spring 2020 total staff including payroll and stipend PhD-candidates was around 130. Of these, some 80 were PhD students, 13 postdocs or researchers, 12 support staff, and 27 scientific staff of which 3 are full professors. Five part time professors (0.2 fte) by special appointment form relationships with crucial other players in the Dutch research infrastructure, such as NIOO, Naturalis, and RIVM.

Research is organized in clusters according to a matrix of three method areas and four applications areas. The method areas are: 1. Tools for sustainable resource use; 2. Impact assessment methods; and 3. Systems approaches. The application areas are: 1. Future resources; 2. Sustainable built environment; 3. Food and agricultural systems; and 4. Natural environment.
At the moment of this review, the matrix consisted of ten clusters:

1. Future Resources Hub, which includes the subjects 'responsible and resilient supply of raw materials for the energy transition', 'urban sticks, urban mining & circular economy', and 'responsible sourcing of (critical) raw materials'.
2. Sustainable Built Environment, which includes the subjects 'building stock modelling: circularity and carbon neutrality', 'focal point: cities', and 'focal point: circular constructions'.
3. Spatially explicit impact assessment (e.g. food & agriculture), which includes the subjects 'biodiversity impact assessment', 'water and nutrient cycles', 'multiregional input/output analysis'.
4. Natural Environment: Biodiversity and sustainable development in Africa, including the subjects 'conservation biology', 'large herbivore diversity', and 'SDG interactions in Africa'.
5. LCA of Current and Future Technologies, including the subjects 'ex-ante LCA: new technology in a future context', 'activity browser: new, influential open source LCA software', and 'support in technology development projects'.
6. Environmental Toxicology and Novel Materials, including the subjects 'ecology in ecotoxicology testing', 'hazard assessment of emerging novel materials', and 'safe-by-design'.
7. Developing (e)DNA tools to improve biodiversity studies, which includes the subjects 'scientific research through CML and LU collaborations', 'fundamental quantitative eDNA technologies', and 'societal impact through BioMon'.
8. Ecosystem services, Nature-based solutions, which includes the subjects 'coastal climate change adaptation', 'nature-based solutions for urban & rural challenges', and 'science-policy interface'.

9. Remote sensing of biodiversity and ecosystem functioning, including the subjects 'tools for retrieving ecosystem information', 'biodiversity from space', and 'support for policy making'.
10. Liveable communities – Liveable planet, which includes the subjects 'sustainable development of communities for a liveable planet', 'Scaling approach', and 'science-policy interface'.

The clusters are each headed by one of the CML professors (full, associate or assistant), but are reported to have no formal status within the organization of CML.

CML chairs the Leiden-Delft-Erasmus Centre for Sustainability (LDE CfS), one of the five joint centres of Leiden University, Delft University of Technology (TUD) and Erasmus University Rotterdam (EUR). The CfS Innovation hubs on the Greenport, Cities and Industry form 'triple helix' connections with industry and policy in these domains. CML is a member of the Dutch environmental university research cluster SENSE (Socio-Economic and Natural Sciences of the Environment). CML is the host of the International Society of Industrial Ecology (ISIE), one of the main global scientific societies in CML's field. CML has a broad range of international collaborations, ranging from e.g. Yale University, the International Institute for Applied Systems Analysis IIASA, University College London, KU Leuven, Tsinghua University, Universitas Indonesia, and many others.

3 Assessment of the research of CML

3.1 Research CML

Principal	Leiden University
Unit	Institute of Environmental Sciences (CML)
Directors	Prof. Arnold Tukker and Prof. Peter van Bodegom

Assessment:

Research input scientific staff 2019	19.6 fte (24 pers.)
Research input post-docs 2019	11.5 fte (13 pers.)
PhD candidates in 2019	83
Research quality	**2 (very good)**
Relevance to society	**1 (world leading/excellent)**
Viability	**2 (very good)**

Research quality

The Institute of Environmental Sciences impressed the committee for its broad research spectrum of tools, methods and analyses. CML clearly contributes with basic and applied science to our understanding of the use and sustainability of our planet resources. The mission and strategy of CML are clear in that perspective. The variety of approaches result in a wide range of insight in environmental issues and applications in the economic, technological, political and social spheres.

The committee acknowledges the scientific impact of both departments that constitute CML: Industrial Ecology (IE) and Environmental Biology (EB). In the six years since the previous assessment, CML has gone through an impressive development both in size and in breadth. CML is internationally recognized as being at the forefront of industrial ecology research, and is also (re)developing a very strong profile in environmental biology. The research groups within IE and EB that have presented their work to the committee showed high quality research, some of which published in top-tier journals of their fields. The informal structure of these research groups allows the researchers to interact and cooperate where needed, but the synergies and cross-fertilization between expertise at the departments IE and EB have potential to be further explored and enhanced.

There has been a rapid growth of the institute with hiring of many early-career researchers, including some rising stars. The citation rates are very good. The quantity of published research contributions has been impressive, even more so

considering the heavy teaching load of the assistant professors, due to the growth of student numbers in the various bachelor and master programmes. The panel felt that CML has a strong academic leadership that enables an appealing and productive research atmosphere. The rapid growth of the institute, although bringing a clear strengthening of the research, resulted also in a low ratio of full professors to junior staff and PhD students. The panel is of the opinion that this low full professor vs PhD student ratio needs to be urgently corrected to avoid supervision problems in the long term, for instance by promoting or hiring more researchers to full and associate professor level. The current hiring plan is considered insufficient in this regard.
According to the panel, another important point of attention is the informal status of the present research groups. Although some groups produce excellent results already, the informal status seems to impair the visibility of the institute, particularly given the breadth of CML's research activities. The committee therefore advises CML to further explore, identify and communicate specific research themes where the institute is world-leading or could become so—say three or four—but without constraining up-and-coming researchers who may lead independent groups. If this is achieved, CML is in an excellent position to achieve a profile as a world-leading research institute in its field.

The committee assesses CML's overall research quality to be very good.

Relevance to society
CML's research on the sustainable use of natural resources is relevant for many of the UN Sustainable Development Goals (SDGs). CML actively contributes to implementation of its research results at regional, national and international levels in industry and society. Many projects strongly involve non-academic or extra-university partners. The vast majority of CML's research projects, including the PhD projects, have a strong societal impact component. It was clear that global, European, national, regional—relevance is at the forefront of the researchers' concerns.
CML members participate in a wide range of international and national steering committees and expert groups; CML's international visibility in particular is very high. The group leaders lead by example in their commitment to science policy and outreach activities, even having received an international award for their activities. Implementation of CML-developed knowledge, methods and tools is also accomplished by CML's international community of students and researchers: in their global careers they take their capacities obtained in CML everywhere. For example more than 50% of CML's PhD candidates originate from abroad—notably the Global South—and upon their return to their countries, they contribute to sustainable development there. The committee was very pleased to find that societal relevance is a key aspect of PhD training; PhD students showed

a clear idea of communication about and application of their research results in their presentations.
Although the bottom-up, people oriented approach to outreach has been highly successful, CML nevertheless could still benefit from a more structured science to policy and outreach approach. The committee recommends establishing a dedicated position to coordinate CML's science-policy activities and defining a dedicated plan.

The committee considers the relevance to society of CML to be world leading/excellent.

Viability
The growth CML has gone through in the last six years shows that the institute is highly viable: the institute has been very successful in attracting increasing amounts of basic and external funding. Overall funding doubled in the last 6 years, a truly impressive achievement. Growth in basic funding has been due to the increased numbers of students. Overall, the funding position appears to be very solid for the next years. Still, the growth has been, and will be, a challenge for the institute. Examples thereof are the high teaching load for the starting assistant professors who have often not more than 40% of their time for doing research, and the high pressure on the few senior researchers who supervise large numbers of PhD students and junior researchers.
Having a young staff is a great advantage as they bring a constant influx of new research ideas, but the majority have a fixed contract for six years, and some of them may not be offered permanent positions at CML at the end of this period. A high rate of teaching staff rotation can cause burden on their mentoring by the permanent staff. The panel recommends lowering teaching loads of starting assistant professors, e.g. 20% in their first three years as is common at many Dutch universities, to allow for more research time, and offering more tenured or tenure-track contracts. In addition, the panel recommends a more structured policy to help assistant professors and other early career researchers in their career development, looking both inside and outside CML, and to provide more training and mentorship on academic leadership and outreach skills.
With respect to the high supervisory workload of the full professors, the committee was surprised to learn that the senior associate professors were not offered to obtain the *ius promovendi*, notwithstanding their crucial role in supervising PhDs and younger researchers. The committee advises Leiden University to remedy this situation in accordance to what is internationally customary.

The committee assesses CML's viability to be very good.

3.2 PhD training and education program

The committee was impressed by CML's PhD program that serves a large group of diverse, apparently very talented PhD candidates. The PhD program appears to be adequate and is appreciated by the PhD students. The graduate school offers courses to the students, and a PhD council has been established to help PhDs organize their community.

The PhDs demonstrated to the committee their dedication to their research projects and their societal impact. The students feel that both departments at CML interact and that it is easy to ask for feedback from other groups. Despite their large numbers—and few promotors—they reported very favourably of the supervision they received from the professors of all levels. Still, the committee is convinced—as mentioned above—that the risk of a lack of time from supervisors should be reduced and suggests to substantially lower the PhD/supervisor ratio. The 90% success rate is good as is the time-to-finish. The PhD students mentioned that some of them experience high workloads and that some have experienced problems to stay mentally fit throughout the PhD project. The PhD council has set up a course to try and remedy this. It would be advisable to follow up on whether the course is sufficient to help the students facing these problems.

The committee learned that there exists a demand from PhD students for more specific courses at CML that are not offered by the graduate school. Mentioned were the need for more training in computer skills, programming and data analysis. Also training aimed at future career paths, sometimes outside academia, would be welcomed. The committee advises CML to explore how to meet these needs.

3.3 Integrity

CML has adopted the proper policies to deal with integrity issues. Data management plans for all research projects, including the PhD projects, are in place and function in a transparent way. The panel commends the open science record of CML, including publishing in open-source journals and the sharing of data and tools. Integrity courses for the PhDs are available and the existence of an ethics committee is a positive asset.

It was brought to the attention of the committee that in case of actual integrity issues, a more secure route involving a confidential advisor from outside CML would likely be beneficial. The committee advises to make such a route possible and to include it on a document available to all PhD students and employees, listing also other resources on scientific integrity and eventually complementary to the VSNU code of conduct.

3.4 Diversity

CML is a very diverse research institute with many nationalities from around the world. The committee was positively impressed with the diversity of students and

young professors. Overall, there is a good gender balance, but in the higher ranks the uneven female presence (only 5 of the 24 scientific staff are women) requires a step increase on proactive measures. CML's human resources policy should take a proper life-work balance into account to support more women reaching associate and full professor level, including programs supporting reintegration after parental leave. The buddy system for new PhD students facilitates their integration in the group. The committee advises to continue to work on a balanced gender position.

3.5 Strategic questions

The committee was asked to reflect on two strategic questions for CML:
1. What direction CML should take to have a research niche that fits well in the Dutch and international research landscape, and
2. What would be the optimal organization structure and size for CML.
The committee agrees with CML that these questions are highly relevant for a sustainable development of the institute. Although the committee cannot provide definitive answers, it gladly shares the ideas that were discussed within the committee.

The rapid growth of CML has led to an impressive, very broad and diverse research landscape that could gain visibility in the national and international academic arena. For instance, the committee was very impressed by CML's work in resource criticality, life cycle assessment, environmental toxicology and human wild-life conflicts, but in other areas it still remained somewhat unclear in this review process, what CML's really strong research areas are. The committee also felt that some of the emphasis on methods could be complemented with more emphasis on explicit research questions and hypotheses. The committee therefore advises to identify three or four of CML's strongest (broad) research topics that are unique for the Netherlands and on which the institute aims to play a world-leading role, to emphasize these in its profile. That would not imply that the other topics should be less pursued, on the contrary. However, a much clearer research strategy defining the primary research questions, complemented with an appropriate communication strategy, is indispensable for CML. Which should be the elected topics is not for this committee to determine. The process of drawing up a new research strategy might take considerable time and should involve the entire staff of the institute.

The optimal way for CML to organize itself should be to aim at ensuring a sustainable situation in the longer run. Key topics to address were mentioned above in this review: the small senior staff/PhD student ratio, the high teaching load and limited career perspectives for the assistant professor staff with a fixed term, and the informal nature of the research groups. Presently, the formal responsibilities are unevenly distributed with an emphasis on the two institute

leaders. Whether CML wants to retain the two present departments is a matter for serious consideration. Either way, more integration, cooperation and cross-fertilization within CML is suggested. Another aspect of the structure that the committee suggests CML to consider is reforming the present strong research groups into more independent research units, headed by assistant, associate or full professors. A redefinition of research priorities across and within the research groups might enhance CML's research profile and at the same time create opportunities for staff members in terms of academic leadership and outreach visibility. An important component of this road is to have more tenure-track or full professors. That could bring CML more in line with what is common in international practice regarding group size and supervisory responsibilities.

3.6 Recommendations

In the assessment above, the committee has made several recommendations, that we restate here. It is important to note that some of the recommendations are for CML directly, but some other recommendations are targeting other governance bodies as they depend on more general policies of the university, including the Faculty of Sciences and Leiden University. We try to make this difference explicit below.

The committee believes CML can continue their recent impressive trajectory towards excellence in multiple aspects or maintaining excellence where it was already achieved, by paying particular attention to the following recommendations:

1. The committee advises CML to further explore, identify and communicate specific research themes where the institute is—or is able to become—world-leading.

2. The committee advises CML to consider reforming the present strong research groups into more independent research units, headed by assistant, associate or full professors.

3. The committee recommends to establish a dedicated position to coordinate CML's science-policy activities and to plan those further, building on the excellent outreach work already being done by CML researchers.

4. The committee recommends that Leiden University offers more researchers a permanent contract and provides them with opportunities to do independent research.

5. The committee advises CML and the Faculty of Sciences to develop a more structured policy for helping junior staff with their careers inside and

outside CML and with further developing academic leadership and outreach skills.

6. The committee advises the Faculty of Sciences' Graduate School to explore with CML the demand for specific courses for PhD candidates targeted at their specific needs.

7. The committee advises the Faculty of Sciences to install an independent, confidential advisor for consultation in the case of integrity issues.

8. The committee advises to continue to work towards a more balanced gender position of CML's staff.

Annex 1 Criteria and scores of national protocol SEP

Criterion 1: Research quality
The committee assesses the quality of the institute's research and the contribution that research makes to the body of scientific knowledge. The committee also assesses the scale of the institute's research results (scientific publications, instruments and infrastructure developed by the group, and other contributions to science). The following elements are to be considered in assessing this criterion:

- scientific quality
- productivity to the scientific community (in relation to the volume of the tenured scientific staff)
- the academic reputation of the group
- the strategy to provide the output at the highest relevant level possible

Criterion 2: Relevance to society
The committee assesses the quality, scale and relevance of contributions targeting specific economic, social, or cultural target groups, of advisory reports for policy, of contributions to public debates, and so on. The point is to assess contributions in areas that the institute has itself designated as target areas. The following elements—if applicable—are to be considered in assessing this criterion:

- a narrative in which the group demonstrates its relevance for society
- research products for societal target groups such as: professional publications and outreach to the general public, other research output to society
- use of research products by societal groups such as patents, licences, training courses
- projects in cooperation with societal partners (European Union, *Topsectoren*, international funds)
- contract research (including consultancies), also co-publications and use of facilities
- present jobs of alumni
- demonstrable marks of recognition by societal groups such as demonstrated by advisory reports for the government
- media exposure as presentations on radio / TV, invited opinion articles etc.
- membership societal advisory boards

Criterion 3: Viability
The committee assesses the strategy that the institute intends to pursue in the years ahead and the extent to which it is capable of meeting its targets in research and society during this period. It also considers the governance and

leadership skills of the institute's management. The following elements are to be considered in assessing this criterion:

- leadership
- (scientific) visibility and recognition
- research vision and strength of the research lines
- innovative strength
- strategic choices and decisions
- composition of the group (expertise, people)
- acquisition capacity

The meaning of the scores for the three main assessment criteria:

Score	**Meaning**	**Research quality**	**Relevance to society**	**Viability**
1	Excellent / world leading	One of the few most influential research groups in the world in its particular field	An outstanding contribution to society	Excellently equipped for the future
2	Very good	Very good, internationally recognized research	A very good contribution to society	Very well equipped for the future
3	Good	Good research	Makes a good contribution to society	Makes responsible strategic decisions and is therefore well equipped for the future
4	Unsatisfactory	Does not achieve satisfactory results in its field	Does not make a satisfactory contribution to society	Not adequately equipped for the future

Annex 2 Terms of Reference CML Assessment

The board of the University of Leiden hereby issues the following Terms of Reference to the assessment committee of the Institute of Environmental Sciences (CML) chaired by Prof. Henrique Pereira, iDiV, Germany.

Assessment
You are being asked to assess the quality and relevance to society of the research conducted by CML between 2014 and 2019 as well as its strategic targets and the extent to which it is equipped to achieve them. You should do so by judging the unit's performance on the three Standard Evaluation Protocol (SEP) assessment criteria:

1. Research quality
2. Relevance to society
3. Viability

Please take into account current international trends and developments in science and society in your analysis. For a description of these criteria, see Section 2 of the SEP. Please provide a written assessment on each of the three criteria and assign the research unit to a particular category (1,2,3 or 4) in each case, in accordance with the SEP guidelines. Please also provide recommendations for improvement.

We would like your report to provide a qualitative assessment of CML as a whole in relation to its strategic targets and to the governance and leadership skills of its management Please also make recommendations concerning these two subjects. Besides an assessment of the whole institute, we ask you to provide a qualitative assessment of the 2 research clusters of the institute:

1. Environmental biology
2. Industrial ecology

ln accordance with the SEP, please also reflect on the following three aspects in your report:

1. PhD programmes
2. Research integrity
3. Diversity

ln the SEP protocol, indicators of research quality explicitly include qualitative output such as instruments and infrastructure developed by the research unit. We want to pose two additional questions to the protocol, for which where relevant possible indicators will be made available in due time. We ask you to pay special attention to the following points. Between 2014 and 2019 CML more than doubled in size and is now one of the main university research institutes in

the Dutch sustainability landscape. CML faces two strategic questions on which a reflection of the committee would be helpful:

a) Content wise, into what direction can CML develop itself best to have a research niche that fits well in the Dutch and international research landscape?
b) Organizationally, do you see an optimal size for CML, and what organization structure would you recommend?

Documentation

The necessary documentation will be available on a secure website no later than 15 May 2020[1]. The documents will include at least the following;

1. Self-evaluation reports of the above-mentioned institute
2. Combined appendices prescribed by the SEP format;
3. The Standard Evaluation Protocol 2015-2021;
4. These Terms of Reference for the Assessment Committee;
5. The program for the site visit;
6. Short CVs of the committee members and secretary;
7. Leiden Protocol for Research Assessment 2015-2021.

Site visit

Interviews of the committee with the board and fellows of the research programs will take place in Leiden on x and y June 2020. The secretary of the committee will contact you about logistical matters no later than two months prior to the site visits.

Statement of impartiality and confidentiality

Before embarking on your assessment work, you will be asked to sign a statement of impartiality. In this statement, you declare that you have no direct relationship or connection with the research unit to be assessed.

Assessment report

We ask you to report your findings in an assessment report drawn up in accordance with the SEP guidelines and format. You must send the draft report to the relevant research unit no more than 8 weeks after the site visit. The research unit will check the report for factual inaccuracies; if such inaccuracies are detected, you will see that they are corrected. You will then send (the corrected version of) the assessment report to the board.

[1] Postponed to early 2021 due to the covid-19 pandemic.

Annex 3 Programme Online Site Visit CML

Day 1	Thursday 11 March 2021	
09:00 – 10:00	Commitee exchanges first impression on the self-assessment and prepares clarifying questions for the CML MT	Review committee
10:00 – 11:00	Interview committee with CML MT/professors • Short presentation CML on the self-assessment • Key questions of the panel to be clarified during the site visit	Management Team, Education Directors and Full professors Prof. Arnold Tukker Prof. Peter van Bodegom Paul de Hoog Dr. Stefano Cucurachi Prof. Martina Vijver Prof. Jan Willem Erisman
11:00 – 12:00	Committee prepares for the virtual site visit	Review committee
Day 2	Friday 12 March 2021	
09:00 – 09:30	Introduction of Committee to CML and presentation of the agenda and modus operandi review process	CML MT and all staff interested
09:30 – 11:00	Presentation and discussion on key research lines at CML Opportunity for questions of the committee on CML's working environment	Selection of scientific staff of CML: Dr. René Kleijn Dr. Mingming Hu Dr. Laura Scherer Dr. Michiel Veldhuis Dr. Bernhard Steubing Prof. Martina Vijver Dr. Krijn Trimbos Dr. Alexander van Oudenhoven Prof. Peter van Bodegom Prof. Jan Willem Erisman Prof. Arnold Tukker
11:00 – 11:15	Reflection time Committee	Review committee

11:15 – 12:45	PhD pitches	10 PhD students, divided in 3 channels: Room 1 Di Dong Janneke van Oorschot Sebastiaan Deetman Room 2 Carlos Blanco Rocha Franco Donati Glenn Aguilar Hernandez Room 3 Qi Chen Sam Boerlijst Tom Nederstigt Weilin Huang
12:15 – 13:00	Lunch	Review committee:
13:00 – 13:30	Consultation meeting with PhD council / representatives PhD candidates	PhD Committee: Brenda Miranda Xicotencatl Dirk Jan Kok Elizabeth Migoni Alejandre Jianhong Zhou
13.30 – 14.00	Consultation meeting with UHDs/Associate professors	Dr. René Kleijn Dr. Jeroen Guinée
14.30 – 15.00	Consultation meeting with UDs/assistant professors	Dr. Laura Scherer Dr. José Mogollon Dr. Alexander van Oudenhoven Dr. Emily Strange
15:00 – 16:30	Formulation preliminary assessment and conclusions	Review committee
16:30 – 17.15	Final meeting with Institute Management: initial feedback	CML MT, all staff interested

Annex 4 Research data

a. Composition of CML (fte / #)

	2014	2015	2016	2017	2018	2019
Scientific staff (fte)	8.6	11.9	14.5	14.6	17.2	19.6
Post-docs (fte)	3.3	6.8	8.9	10.9	11.6	11.5
PhD candidates (#)	30	36	41	65	74	83
Visiting fellows (#)	0	0	0	0	0	0
Total research staff	**20.6**	**27.9**	**35.9**	**43.7**	**52.3**	**54.1**

b. Financing structure

Funding (FTE):	2014	2015	2016	2017	2018	2019
Direct funding	16.2	20.53	21.66	23.00	28.12	30.37
Research grants	1.2	4.11	9.20	9.51	9.34	5.53
Contract research	10.5	9.18	14.67	20.26	26.34	30.14
Total funding	**27.9**	**33.81**	**45.53**	**52.76**	**63.80**	**66.05**
Expenditure (k€)						
Personnel costs	2.114	2.573	3.232	3.828	4.755	5.197
Other costs	579	1.033	621	1.135	1.155	1.329
Total expenditure	**2.693**	**3.606**	**3.853**	**4.963**	**5.910**	**6.526**

c. Numbers of publications

	2014	2015	2016	2017	2018	2019	Total
Refereed articles	61	71	85	105	147	140	611
Non-refereed papers	6	2	1	1	3	1	14
Books	3	1	1	1	1	2	9
Book chapters	8	4	2	6	9	4	33
PhD theses	2	11	5	6	6	9	39
Professional publications	7	9	11	8	7	10	52
Publ. for general public	1	8	17	6	34	18	84
Datasets & website	0	0	0	0	1	1	2
Other (research) output	5	6	10	4	10	2	37
Total publications	95	112	132	137	218	187	881

Annex 5 Curricula vitae of the Committee members

Prof Henrique Miguel Pereira (chair) is Head of the Research Group Biodiversity Conservation at the German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig. His research aims at understanding the patterns and processes of global biodiversity change, with the goal of informing environmental policy and management of ecosystems. The group is particularly interested in the impacts of land-use change on biodiversity and ecosystem services across scale. Research ranges from fieldwork on the biodiversity consequences of rewilding abandoned farmland to models of biodiversity for future socio-economic scenarios. The group strives to also bring the best science to policy making, so we engage in multiple fora with policy makers, including the Intergovernmental Platform for Biodiversity and Ecosystem Services and the Convention on Biological Diversity. Finally, the group wants to contribute to improve the availability of data on biodiversity change worldwide, so they host the secretariat of the Group on Earth Observations Biodiversity Observation Network. Prof. Pereira has published over 120 papers in the peer-reviewed literature, of which various in high level journals including Science and Nature.

Prof. Mark Huijbregts leads the research group Environmental Science within the Institute of Water and Wetland Research at the Radboud University Nijmegen. He is the chair of Integrated Environmental Assessment. He mainly focuses on the development and evaluation of environmental indicators, and the method development in the field of life cycle assessment and risk assessment, and the application of such tools in the field of renewable energy. Prof. Huijbregts is the recipient of an ERC Consolidator grant, and a Dutch Science Foundation (NWO) Vici grant. Prof. Huijbregts published well over 200 peer-reviewed papers, of which various in high level journals including Nature.

Emilia Ingemarsdotter is a Ph.D. student in Design for Sustainability and Circular Economy in the Industrial Design Engineering Faculty at TU Delft, the Netherlands. She is one of 15 Ph.D. students in the Circular European Economy Innovative Training Network, Circ€uit. In her Ph.D. thesis, Emilia uses case study research and life cycle assessment to explore the opportunities, implementation challenges, and environmental impact of using the Internet of Things to support circular design strategies. Emilia holds a Master of Science in Engineering Physics and Industrial Ecology from Chalmers University of Technology in Gothenburg, Sweden. Her master thesis explored technical and economic development of distributed energy generation and its potential influence on power system architectures. During her master's studies, she also assisted in research about the use and recycling of critical raw materials.

Dr. Serenella Sala (JRC, Ispra, Italy) works at the Land Resources unit of the Directorate D (Sustainable Resources) JRC- European Commission. Since 2010, at the JRC, she leads projects on sustainability assessment of supply chains, adopting Life cycle assessment as reference method. Her research activities are focused on the emerging discipline called "sustainability science". With strong interdisciplinary approach, she developed methodologies and models for sustainable development, integrated environmental assessment, life cycle assessment, risk assessment for supporting eco-innovation of process and products as well as resource efficiency. As focus at the JRC, she was involved in the release of recommendation for Life cycle impact assessment and in the development of life cycle based indicators at micro and macro scale. Before 2010, she was the coordinator of the Research Unit on Sustainable Development (GRISS) at the Department of Environmental Science at University of Milano Bicocca.

Prof. Jens-Christian Svenning is Director of the Centre for Biodiversity Dynamics in a Changing World at Aarhus University, Denmark. He is a macroecologist and biogeographer, with strong interest in plants, animals and people across the world. Alongside basic curiosity about nature, Jens-Christian Svenning is highly motivated to contribute to help overcome the climate and biodiversity crises and promote sustainable societal development. His research includes strong foci on fundamental drivers of biodiversity, climate change impacts on biodiversity and ecosystems, and human-nature interactions from the past to the future, with strong interest in fundamental issues such as disequilibrium dynamics and top-down trophic effects. Key applied research foci include predictive modelling, the application of informatics and space-borne and other remote sensing technology to ecological and sustainability research, human dependence on and benefits from nature, and rewilding as a promising approach to ecosystem restoration. Jens-Christian Svenning is highly committed to ensuring the societal benefits of his research and knowledge, working closely with a range of public and private actors on concrete real-world conservation, restoration and sustainability projects and challenges, as well as doing large amounts of outreach. Prof. Svenning has published almost 400 papers in the peer-reviewed literature, including in Science and the Nature family of journals. He is recognized as a highly cited researcher by the Web of Science group.

Frans van Steijn (secretary) studied physics (BSc) at the Vrije Universiteit Amsterdam and philosophy (MA) at the University of Amsterdam. He received a PhD at the UvA on a thesis "The Universities in Society; a Study of part-time professors in the Netherlands"(1990). Since 1996 Frans was senior advisor at Vereniging van Universiteiten (VSNU), the Association of Universities in the Netherlands. He was Secretary to the Board and Secretary to the Rector's

Conference. His expert fields are quality assurance, research policy and research integrity.
In September 2014 Frans retired from VSNU and established an independent office for consultancy and project management, specialized in quality assurance in universities and research organizations. In that new capacity Frans van Steijn assisted several research review committees and an institutional audit as secretary.