

World Sustainability Series

Walter Leal Filho · Amanda Lange Salvia ·
Rudi W. Pretorius · Luciana Londero Brandli ·
Evangelos Manolas · Fatima Alves ·
Ulisses Azeiteiro · Judy Rogers ·
Chris Shiel · Arminda Do Paco *Editors*

Universities as Living Labs for Sustainable Development

Supporting the Implementation of the
Sustainable Development Goals

 Springer

World Sustainability Series

Series Editor

Walter Leal Filho, European School of Sustainability Science and Research, Research and Transfer Centre “Sustainable Development and Climate Change Management”, Hamburg University of Applied Sciences, Hamburg, Germany

Due to its scope and nature, sustainable development is a matter which is very interdisciplinary, and draws from knowledge and inputs from the social sciences and environmental sciences on the one hand, but also from physical sciences and arts on the other. As such, there is a perceived need to foster integrative approaches, whereby the combination of inputs from various fields may contribute to a better understanding of what sustainability is, and means to people. But despite the need for and the relevance of integrative approaches towards sustainable development, there is a paucity of literature which address matters related to sustainability in an integrated way.

More information about this series at <http://www.springer.com/series/13384>

Walter Leal Filho · Amanda Lange Salvia ·
Rudi W. Pretorius · Luciana Londero Brandli ·
Evangelos Manolas · Fatima Alves ·
Ulisses Azeiteiro · Judy Rogers ·
Chris Shiel · Arminda Do Paco
Editors

Universities as Living Labs for Sustainable Development

Supporting the Implementation
of the Sustainable Development Goals

Editors

Walter Leal Filho
European School of Sustainability
Science and Research
HAW Hamburg
Hamburg, Germany

Amanda Lange Salvia
European School of Sustainability
Science and Research
HAW Hamburg
Hamburg, Germany

Rudi W. Pretorius
Department of Geography
University of South Africa
Johannesburg, South Africa

Luciana Londero Brandli
University of Passo Fundo
Passo Fundo, Brazil

Evangelos Manolas
Democritus University of Thrace
Komotini, Greece

Fatima Alves
Department of Social Sciences
and Management
Universidade Aberta
Porto, Portugal

Ulisses Azeiteiro
Universidade de Aveiro
Aveiro, Portugal

Judy Rogers
School of Architecture and Design
RMIT University
Melbourne, VIC, Australia

Chris Shiel
Department of Life
and Environmental Science
Bournemouth University
Poole, UK

Arminda Do Paco
Department of Business and Economics,
Research Unit NECE
Universidade da Beira Interior
Covilha, Portugal

ISSN 2199-7373

ISSN 2199-7381 (electronic)

World Sustainability Series

ISBN 978-3-030-15603-9

ISBN 978-3-030-15604-6 (eBook)

<https://doi.org/10.1007/978-3-030-15604-6>

Library of Congress Control Number: 2019934363

© Springer Nature Switzerland AG 2020

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

A living labs approach provides good opportunities to improve the environmental sustainability of universities, combining the expertise of staff and students, and encourages the application of knowledge to a real-world context. But despite its relevance and applicability, the use of a living labs approach is not as widely used as it can- or should-be.

This book addresses the need for academic materials related to living labs in a sustainable development context. It contains a set of papers presented at the “4th World Symposium on Sustainable Development at Universities” (WSSD-U-2018), which was held at the Universiti Sains Malaysia (USM) in Malaysia, organised by Manchester Metropolitan University (UK), the Research and Transfer Centre “Sustainable Development and Climate Change Management” of the Hamburg University of Applied Sciences (Germany), and the World Sustainable Development Research and Transfer Centre, in cooperation with the Inter-University Sustainable Development Research Programme (IUSDRP) and the United Nations University initiative “Regional Centres of Expertise on Education for Sustainable Development” (RCE).

The “4th World Symposium on Sustainable Development at Universities” (WSSD-U-2018) focused on “Universities as Living Labs for Sustainable Development: Supporting the Implementation of the Sustainable Development Goals” and provided a contribution to the further development to the debate on the use of a living labs approach as a means to foster the cause of sustainable development at higher education institutions.

This book is structured around three main parts as follows:

- Part I: Campus as Living Labs for the SDGs
- Part II: Education for Sustainable Development
- Part III: Sustainability Processes and Practices

This publication documents practical experiences on education, research and extension (the so-called 3rd Mission, whereby universities outreach to local communities, industry and other groups) and makes them available to a wide audience.

It outlines many initiatives performed at universities to promote environmental sustainability and many interesting case studies from around the world.

We thank the authors for their efforts in elaborating the manuscripts and the reviewers for the many useful comments provided. We hope this book will inspire further initiatives in this rapidly growing field.

Hamburg, Germany
Hamburg, Germany
Johannesburg, South Africa
Passo Fundo, Brazil
Komotini, Greece
Porto, Portugal
Aveiro, Portugal
Melbourne, Australia
Poole, UK
Covilha, Portugal
Spring 2019

Walter Leal Filho
Amanda Lange Salvia
Rudi W. Pretorius
Luciana Londero Brandli
Evangelos Manolas
Fatima Alves
Ulisses Azeiteiro
Judy Rogers
Chris Shiel
Arminda Do Paco

Contents

Part I Campus as Living Labs for the SDGs

Living Labs for Sustainable Development: The Role of the European School of Sustainability Sciences and Research	3
Walter Leal Filho	
Aligning Campus Strategy with the SDGs: An Institutional Case Study	11
Chris Shiel, Neil Smith and Elena Cantarello	
Energy Sustainability at Universities and Its Contribution to SDG 7: A Systematic Literature Review	29
Amanda Lange Salvia and Luciana Londero Brandli	
The Role of Green Areas in University Campuses: Contribution to SDG 4 and SDG 15	47
Luciana Londero Brandli, Amanda Lange Salvia, Vanessa Tibola da Rocha, Janaina Mazutti and Giovana Reginatto	
How Do You Teach Undergraduate University Students to Contribute to UN SDGs 2030?	69
Eric Pallant, Beth Choate and Benjamin Haywood	
Sustainable Campuses as Living Labs for Sustainable Development: An Overview of a Brazilian Community University	87
Issa Ibrahim Berchin, Wellyngton Silva de Amorim, Isabela Blasi Valduga, Mauri Luiz Heerd and José Baltazar Salgueirinho Osório de Andrade Guerra	

Identifying and Overcoming Communication Obstacles to the Implementation of Green Actions at Universities: A Case Study of Sustainable Energy Initiatives in South Brazil	103
João Marcelo Pereira Ribeiro, Aline Autran, Stephane Louise Boca Santa, Ana Valquiria Jonck, Mica Magtoto, Rafael Ávila Faraco and José Baltazar Salgueirinho Osório de Andrade Guerra	
Mobilising the Sustainable Development Goals Through Universities: Case Studies of Sustainable Campuses in Malaysia	121
Jasmin Irisha Jim Ilham, Malik Hisyam Zaihan, Sakiinah Mahamad Hakimi, Mahamad Hakimi Ibrahim and Shakirin Shahrul	
Towards a Learning System for University Campuses as Living Labs for Sustainability	135
L. A. Verhoef, M. Bossert, J. Newman, F. Ferraz, Z. P. Robinson, Y. Agarwala, Paul J. Wolff, III, P. Jiranek and C. Hellinga	
Nurturing the Seeds of Sustainability Governance: Rio+25 Brazilian Higher Education Institution Case Study	151
Ursula Maruyama, Patricia Prado, Aline Trigo and Jose Trigo	
The Transdisciplinary Living Lab Model (TDLL)	167
Dena Fam, Abby Mellick Lopes, Katie Ross and Alexandra Crosby	
Sustainability in Higher Education: Beyond the Green Mirror	183
Amy Walsh, Eleni Michalopoulou, Aisling Tierney, Hannah Tweddell, Chris Preist and Chris Willmore	
The EDINSOST Project: Implementing the Sustainable Development Goals at University Level	193
Silvia Albareda-Tiana, Jorge Ruíz-Morales, Pilar Azcárate, Rocío Valderrama-Hernández and José Manuel Muñoz	
Environmental DNA (eDNA) Metabarcoding as a Sustainable Tool of Coastal Biodiversity Assessment.	211
Z. A. Danial Hariz and M. A. Noor Adelyna	
Visual Displays of the Sustainable Development Goals in the Curricular and Extra-Curricular Activities at Nottingham Trent University—A Case Study	227
Vanessa Odell, Petra Molthan-Hill, Lina Erlandsson and Eleanor Sexton	
Sustainable Development Goals and Current Sustainability Actions at Politecnico di Torino	247
Giulia Sonetti and Patrizia Lombardi	

Achieving Excellence in Sustainable Development Goals in Sunway University Malaysia 265
 Wing Thye Woo, Hock Lye Koh and Su Yean Teh

EDS Integrated Approach for Sustainability (EDS-IA): Campus as a Living Laboratory Experience 283
 Liliana Diaz and André Potvin

Part II Education for Sustainable Development

Auditing the University: Promoting Business Education for Sustainability Through Audit-Based Learning 303
 Kay Emblen-Perry

Enhancing Student Engagement in a Sustainability Class: A Survey Study 323
 Liguang Liu and Lianhong Gao

Opportunities and Challenges of Digitalization to Improve Access to Education for Sustainable Development in Higher Education 341
 Oliver Ahel and Katharina Lingenau

Training Competencies for Sustainable Thinking Through an Educational Nature Trail Supported by a Location-Based Smartphone Game 357
 Ulrike Starker, Andrea Heilmann and Dominik Wilhelm

Upcycling for Teaching and Learning in Higher Education: Literature Review 371
 Kyungeun Sung

Sustainability Practices: The Role of University in Forming Master Students’ Perspectives 383
 Ana Paula Pessotto, Janaína Macke and Fernanda Frankenberger

Interdisciplinary Cooperation and Collaboration in Undergraduate Sustainability-Based Programs: A Canadian Example of Environment and Urban Sustainability (EUS) 399
 Michal Bardecki and Andrew Millward

Adventure Cards, Process Wheels, and a Vision for Digital Storytelling: Learning from Leonardo 417
 Paul J. Wolff, III

Fostering EfS Connections for Community Wellbeing: Working Meaningfully with What We’ve Got 435
 Sherridan Emery, Kim Beasy and Bianca Coleman

Adding Value to Open and Distance Learning Programmes in Nature Conservation Through Sustainability Related Work-Integrated Learning	449
Graeme Wilson and Rudi W. Pretorius	
Cultural-Based Education of Tamansiswa as a Locomotive of Indonesian Education System	471
Cahyono Agus, Pita Asih Bektı Cahyanti, Bambang Widodo, Yuyun Yulia and Siti Rochmiyati	
Academic Strengthening Through a Multi-disciplinary Ph.D. in Sustainable Development	487
Wasan Kanchanamukda and Lindsay Falvey	
Integrating Sustainability within University Sustainability Programme—Students’ Perception on Sustainable Cities and Communities Master’s Programme of the School of Humanities, USM	497
Hafızah Roslı, Narimah Samat and Radieah Mohd. Nor	
Knowledge and Opinions Amongst Youths in Secondary and Tertiary Education on Sustainable Development in Penang, Malaysia	515
Fatin Nabilla Ariffin, Theam Foo Ng and Munirah Ghazali	
Measuring the Effectiveness of Sustainability-Related Course Towards Strengthening the University’s Sustainability Strategy in Teaching and Learning Programmes	533
Theam Foo Ng, Maurice Ian Wee, Fatin Nabilla Ariffin, Ahmad Firdaus Ahmad Shabudin and Mohd Sayuti Hassan	
Mainstreaming Education for Sustainable Development in English as a Foreign Language: An Analysis of the Image-Text Interplay Found in EFL Textbooks in Japanese Higher Education	545
Joshua Jodoin and Jane Singer	
Education for Sustainable Development: The STEM Approach in Universiti Sains Malaysia	567
Su Yean Teh and Hock Lye Koh	
The Integration of Competencies for Sustainable Development: A Case of Study Programmes in a Non-elite University	589
Eglė Staniškienė and Živilė Stankevičiūtė	
Educating ‘Future Professionals’ for Sustainable Development: Piloting a Radical Nutshell Strategy for Organizational Change in Higher Education	605
Susanne Maria Weber	

Part III Sustainability Processes and Practices

Building Collaborative Partnerships: An Example of a 3rd Mission Activity in the Field of Local Climate Change Adaptation 621
 Hardy Pundt and Andrea Heilmann

The Transformation of Higher Education Institutions Towards Sustainability from a Systemic Perspective 637
 Bror Giesenbauer and Merle Tegeler

TEAM Sustainability—The Contribution of Science to the Management of Governments’ Sustainability Advisory Councils 651
 Dorothea Schostok

Participatory Action Research (PAR) as a Research Approach for Sustainable Community Development: A Case Study in Pulau Mantanani, Sabah 671
 Yasmin Rasyid

Post-occupancy Evaluation Focused on Accessibility: Experience of Participation in the University Community 697
 Adriana Gelpi, Rosa Maria Locatelli Kalil and Wagner Mazetto de Oliveira

Comparative Analysis of the Environmental Performance of Latin American University Campuses: Methodological Approaches 717
 S. L. Galván, N. G. Faitani, L. V. Sosa,
 D. N. Lopez de Munain and R. O. Bielsa

PUC-Rio Socio-environmental Agenda: New Steps Towards Sustainability in the University 733
 Maria F. C. Lemos, Lilian Saback, Luiz F. G. Rego, Melissa C. Antunes and Renata A. Lopes

Vortex-Assisted Liquid-Liquid Microextraction for Steroid Profile Analysis: Towards Sustainable Development Goals 2030 747
 Normaliza Abdul Manaf, Bahruddin Saad, Aishah A. Latiff and Suzyrman Sibly

A Survey of Laboratory Practice on Water Scarcity: Conservation of Drained Water from the Water Distillation Process 761
 Siok-Yee Chan, Theam Foo Ng and Mohd Sayuti Hassan

Sustainable Energy Model in Tecnocampus Higher Education Smart Campus 777
 Virginia Espinosa-Duró, Julián Horrillo and Marian Buil

Composting and Anaerobic Digestion as Biotechnological Alternatives for the Valorization of Used Coffee Ground in University Campus 789
Isael Colonna Ribeiro, Roberta Arlêu Teixeira, Livia Luchi Rabello, Jacqueline R. Bringhenti and Adriana M. Nicolau Korres

Sustainable Practices for the Organic Waste Management Generated in an Educational Institution Restaurant 803
Roberta Arlêu Teixeira, Adriana M. Nicolau Korres, Raquel Machado Borges, Livia Luchi Rabello, Isael Colonna Ribeiro and Jacqueline R. Bringhenti

Sustainable Alternative Water Sources Use for Lowering Cost Pressure on Drinking Water and Volume Reduction—Technical and Profitable Feasibility 821
Cassio Faé, Lucien Akabassi, Adriana M. Nicolau Korres, Jacqueline R. Bringhenti and Sheila Souza da Silva Ribeiro

Assessment of Sustainability Elements in Forestry Department of Peninsular Malaysia by Using Universiti Sains Malaysia’s Sustainability Assessment Methodology (SAM) 835
Marlinah Muslim, Siti Fairuz Mohd Radzi and Mohd Sayuti Hassan

Pachamama—La Universidad del ‘Buen Vivir’: A First Nations Sustainability University in Latin America. 849
Susanne Maria Weber and Maria Alejandra Tascón

Part I
Campus as Living Labs
for the SDGs

Living Labs for Sustainable Development: The Role of the European School of Sustainability Sciences and Research



Walter Leal Filho

Abstract This first chapter provides an overview of the concept of living labs for sustainable development and introduces the European School of Sustainability Science and Research as an example of a European wide integrative effort to foster sustainability using a living labs approach.

Keywords Living labs · Sustainable development · Innovation · Ideas · Europe

1 Introduction

The current levels of depletion of natural resources suggests that we urgently need to change the way we teach and do research on environmental issues as a whole, and the ways we tackle matters related to sustainable development in particular. We need to move away from linear economic models, and towards circular ones, where renewable resources are used and social engagement is catalysed.

The “Agenda 2030” agreed by the UN in 2015 and the Sustainable Development Goals (SDGs) in particular, are acting as drivers to more collaborative action in the field of sustainable development, by means of the “quadruple helix model”, i.e. a model which entails linkages between government, academia, society and business. These actors may join efforts in seeking local solutions to global problems, hence mobilising a variety of sectors of society, some of which are not often engaged on sustainability efforts.

The higher education sector has been responding to the challenges sustainability poses to it, in a variety of ways. It may be by means of participatory approaches (Disterheft et al. 2014), or by executing campus assessments (Arroyo 2015), among many other means.

W. Leal Filho (✉)

European School of Sustainability Science and Research, Research and Transfer Centre
“Sustainable Development and Climate Change Management”,
Hamburg University of Applied Sciences, Ulmenliet 20, 21033 Hamburg, Germany
e-mail: walter.leal2@haw-hamburg.de

© Springer Nature Switzerland AG 2020

W. Leal Filho et al. (eds.), *Universities as Living Labs for Sustainable Development*,
World Sustainability Series, https://doi.org/10.1007/978-3-030-15604-6_1

Higher education institutions have also been very diligent in reacting to the calls to help to implement the SDGs (Leal Filho et al. 2018). Universities need to attend the demand from students for new, learner-centred approaches to teaching, integrating SD competences and fostering them in an interdisciplinary way, deploying for this purpose innovative learning methodologies, teaching concepts and didactic tools.

Across the world, many initiatives have been started, and many are in the planning phases, to tackle the many changes related to the implementation of sustainable development. There are also many tools being developed and deployed, to this purpose.

One of them is the “**living labs**” approach, which provides a sound basis for the holistic tackling of sustainable development themes, with a variety of focus and areas. Some of them are:

- i. Waste
- ii. Water
- iii. Energy
- iv. Ecosystems protection
- v. Social issues, including social responsibility

among many others.

According to Liedtke et al. (2012), a living lab is a “combined lab-/household system, analysing existing product-service-systems as well as technical and socio-economic influences focused on the social needs of people, aiming at the development of integrated technical and social innovations”.

As an example of what can be done, Masseck (2017) demonstrated the platform “Living Lab LOW3”, which allows the creation of synergies between actors, programs and projects with an example from the building sector. As part of “Living Lab LOW3”, stakeholders have the opportunity to participate in a community of users beyond established academic structures.

Leal Filho (2015) explained the usefulness of the living labs approach as part of transformative efforts.

But in order to succeed, a living labs approach need to consider not only the need for innovative ways of teaching, but also more research and technology transfer based on a strong interaction between the universities and their local and regional communities.

Also, living labs need to encourage organisations to move forward, from being based on individual activities towards a whole-institution approach as shown in Fig. 1.

One of the contributions the Living Labs approach can provide, is the support of interactions between the academic sector and other parts of society, a goal achieved by means of multi-stakeholder engagement in new open and experimental processes carried out in real world contexts. In this context, local stakeholders may be involved in a variety of ways, for instance:

- (a) by means of projects
- (b) by means of sharing economy initiatives
- (c) by means of tools to foster their participation and engagement



Fig. 1 Evolution of a living labs approach

- (d) by means of research meant to drive and support sustainable habits and behaviours
- (e) by means of demonstration activities which put principles into practice.

Living Labs should not only act as sources of information, but they should also catalyse changes in the sense of societal transformation, and the fostering of more sustainable life styles and practices. As mentioned by Evans et al. (2015), they may be used as co-production and as platforms for sustainability science.

They should also provide a fertile ground to conceive, prototype and test sustainable living solutions, also facilitating cooperation and collaboration across various sectors, hence catalysing the integration of sustainability and innovation.

Table 1 Illustrates some of the measures universities may deploy, with a view to maximise their potentials as living labs.

By means of due consideration to these elements, a sound basis for the integration of concurrent research and innovation processes.

2 The Benefits of Living Labs

Figure 2 describes the benefits from a living labs approach. It can be seen that there are many, and that their nature suggest a living lab approach may be advantageous to universities in many ways.

All in all, the many advantages suggest that the time and resources to be spent in developing a living labs approach are worthy the investment.

Table 1 Measures to maximise universities’ potentials as living labs

Procedure	Means of implementation
Work in an integrated manner	Try to engage colleagues across department and disciplines
Engage local stakeholders	Go beyond the university and engage external actors, many are happy to engage
Pursue partnerships	Seek synergies with organisations pursuing similar goals
Document experiences	Staff should take the time to write down their experiences and publish them
Make an effort to meet peers	Whenever possible, staff should try to attend gatherings to exchange idea and get nee information
Be visible	Show and promote what you do
Foster talent	Engage students at different levels: B.Sc., M.Sc., Ph.D.

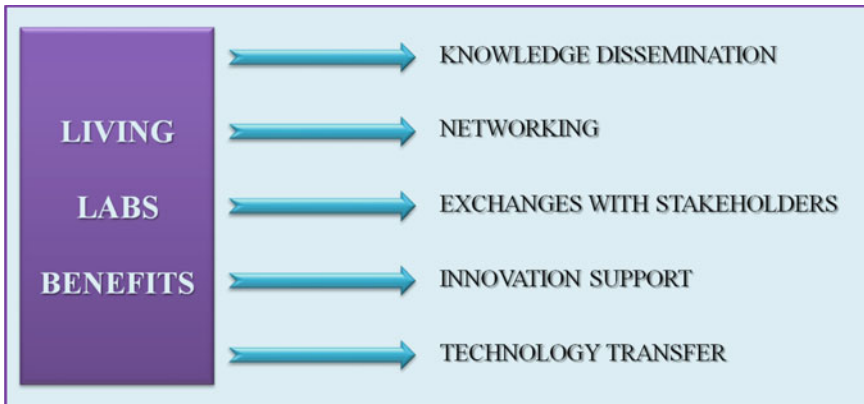


Fig. 2 Benefits from a living labs approach

3 ESSSR as a Living Lab

There is at present in Europe no single organization or setting, which coordinates efforts in the field of sustainability science teaching and research on the continent, in an integrated way. Yet, much could be gained if the extensive body of knowledge, expertise and resources which European universities currently have available, could be consolidated, with a view to strengthening their profiles, activities, and scientific

outputs. It is on the basis of the need to address this gap, that the “European School of Sustainability Science and Research” (ESSSR) was created.

ESSSR is an inter-university consortium composed by members which share an interest on sustainability science and on matters related to sustainable development. Once operating, it will be a key organization, filling in a gap in respect of the coordination of sustainability science teaching and research at European universities seen today.

The mission of ESSSR is:

To provide a framework upon which teaching and research within the remit of sustainability science may be further developed at European universities, by means of joint, digitally-oriented teaching programmes, research projects, Ph.D. training and quality scientific publications to be published in high calibre journals.

ESSSR was brought to life based on the perceived need to explore new ideas, develop new approaches and new methods in the field of sustainability science, to meet current and future needs, and which can also help to achieve the many goals listed in the document “Transforming our world: the 2030 Agenda for Sustainable Development”.

ESSSR works as a living lab, in the following ways:

- I. it provides a platform for universities to discuss the contribution of Sustainability Science and Research towards the implementation of the SDGs;
- II. it mobilises universities working with sustainable development, to gather, deliberate and implement joint initiatives, especially online courses, research projects and specialist publications, which show how Sustainability Science and Research can help to achieve the SDGs;
- III. it contributes to the education of next generation of sustainability scientists, by means of on-line courses and joint Ph.D. programmes on sustainability science.

In addition, ESSSR links European sustainability researchers with their counterparts in other parts of the world (north-south and south-south cooperation on sustainable development). ESSSR also strengthens interdisciplinary and pioneering research on sustainability issues, by also paving the way for post-doctoral positions and fellowships across its members.

ESSSR undertakes activities focusing on four main areas, in cooperation with its partners:

Area 1- Courses on sustainability science, especially online ones, hence furthering the digitalisation of teaching and learning

Area 2- Research projects on sustainability science

Area 3- Research publications on sustainability science

Area 4- Joint training of Ph.D. students on sustainability science, as well as post-doctoral positions and fellowships.

These four key areas also address the need for integrated approaches towards sustainable development, and hence contribute to the implementation of the SDGs. The themes the ESSSR are as follows:

Theme 1: Political, social and economic dimensions of sustainable development
 Theme 2: Environmental and technological dimensions of sustainable development
 Theme 3: Holistic approaches to sustainable development
 Theme 4: Stakeholders' engagement in sustainable development
 Theme 5: Education for sustainable development.

ESSSR is a worthy investment to its members for a number of reasons:

- (a) members can join efforts to perform works on sustainability in an integrated way and do not work alone.
- (b) ESSSR supports the research strategies of member universities in four central areas:
 - (i) internationalisation by being part of a strong European consortium, collaborating with many member universities;
 - (ii) increase in the income from research projects by having qualitatively and quantitatively more projects on sustainability issues;
 - (iii) training of more Ph.D. students, by means of joint supervisions of more Ph.D. theses and post-doctoral fellows, engaging interested professors from different Faculties;
 - (iv) fosters technology transfer by bringing the results of scientific projects to use, supporting societal changes
- (c) ESSSR equally fosters teaching (by digital means) and research, with contents which may be beneficial to many university students
- (d) It enhances the image of the member universities as internationally-oriented research organisations, and markets them internationally as key players on the subject
- (e) The new projects generated, automatically lead to additional income and overheads
- (f) The investment needed is modest, with an office and contact person to serve as the link and coordinate the inputs of each member university.

Finally, being part of an institution such as ESSSR assists members' efforts to access mainstream funding from research, being part of many other projects, hence increasing their presence in the international research arena.

4 Conclusions

The Living Lab approach provides opportunities to both students and research staff to engage more on social, economic and environmental sustainability, both within a university's setting and outside it.

In order to yield the expected benefits, living labs should draw on the available expertise of staff and the inherent talent of students, as well as take into account inputs

from their local communities, to foster the application of knowledge to current and concrete situations and contexts.

The ESSSR is an attempt to promote a living labs approach and to work on an integrated manner, to help to improve an institution's environmental sustainability, to train staff, students, foster publications and the dissemination of good practice. By doing so, it may integrate principles into practices, and provide a concrete contribution towards a more sustainable living.

References

- Arroyo P (2015) A new taxonomy for examining the multi-role of campus sustainability assessments in organizational change. *J Cleaner Prod*. <http://doi.org/10.1016/j.jclepro.2015.08.100>
- Disterheft A, Caeiro S, Azeiteiro UM, Filho WL (2014) Sustainable universities—a study of critical success factors for participatory approaches. *J Clean Prod* 106:11–21. <https://doi.org/10.1016/j.jclepro.2014.01.030>
- Evans J, Jones R, Karvonen A, Millard L, Wendler J (2015) Living labs and co-production: university campuses as platforms for sustainability science. *Curr Opin Environ Sustain* 16:1–6. <https://doi.org/10.1016/j.cosust.2015.06.005>
- Leal Filho W (ed) (2015) *Transformative approaches to sustainable development at universities: working across disciplines*. Springer, Berlin
- Leal Filho W, Tripathi SK, Andrade Guerra JBSOD, Giné-Garriga R, Orlovic Lovren V, Willats J (2018) Using the sustainable development goals towards a better understanding of sustainability challenges. *Int J Sustain Dev World Ecol*. <https://doi.org/10.1080/13504509.2018.1505674>
- Liedtke C, Welfens MJ, Rohn H, Nordmann J (2012) LIVING LAB: user-driven innovation for sustainability. *Int J Sustain High Educ* 13(2):106–118. <https://doi.org/10.1108/14676371211211809>
- Massek T (2017) Living labs in architecture as innovation arenas within higher education institutions. *Energy Procedia* 115:383–389

Aligning Campus Strategy with the SDGs: An Institutional Case Study



Chris Shiel, Neil Smith and Elena Cantarello

Abstract Evidence suggests that while many universities promote their green credentials, fully embedding sustainability across the university (campus, curriculum and community) and securing the full engagement of academic staff, is not without challenge. This paper argues that the Sustainable Development Goals may provide an opportunity to revitalise institutional efforts in relation to education for sustainable development. A case study is presented of an institution that is well-regarded for its green credentials yet continues to struggle to ensure that education for sustainable development permeates the curriculum, despite institutional strategy and policy drivers. The potential of the Sustainable Development Goals to catalyse further engagement within the institution is explored; examples are provided of how they are being used both within the curriculum, and also influencing strategy change. The conclusion suggests that while there is potential in a change of focus, substantial efforts are required to reinforce the responsibilities of higher education in relation to the goals. This paper will be useful to anyone interested in embedding sustainable development within universities and developing a strategy to address the global goals.

Keywords Sustainable development · SDGs · Higher education · Case studies

1 Introduction

In September 2015, world leaders made a commitment to the Sustainable Development Goals (SDGs) formulating 17 goals, aimed at achieving an end to extreme poverty, combatting inequality and injustice and tackling climate change, by 2030.

C. Shiel (✉) · N. Smith · E. Cantarello
Bournemouth University, Fern Barrow, Poole Dorset BH15 5BB, UK
e-mail: cshiel@bournemouth.ac.uk

N. Smith
e-mail: nsmith@bournemouth.ac.uk

E. Cantarello
e-mail: ecantarello@bournemouth.ac.uk

© Springer Nature Switzerland AG 2020

W. Leal Filho et al. (eds.), *Universities as Living Labs for Sustainable Development*,
World Sustainability Series, https://doi.org/10.1007/978-3-030-15604-6_2

It is incumbent on each signatory to bring the goals to life; nothing will be achieved without action on multiple fronts. While governments need to develop national strategies and approaches for realising the goals, all organisations in society have a role to play in contributing to their achievement. Higher education institutions (HEIs), in particular, should be taking a leading role, through research (Leal Filho et al. 2017a); they should also be educating students in relation to the goals and, inspiring engagement within their communities. Just as the role of HEIs has been made quite clear in relation to sustainable development, with a need for integrative approaches (Leal Filho et al. 2015), the role of universities in relation to the SDGs is obvious, albeit not explicit. What is less clear however, is whether universities will fully appreciate their responsibility for the SDGs. History shows that their response to calls to engage with sustainable development was not only notably slow (Tilbury 2013), but has rarely been holistic, or very strategic (Leal Filho et al. 2015). Thus, is it likely that they will respond to the SDGs with greater speed or effectiveness? Will it be the case that many universities endorse the SDGs publically but beyond that, will not regard them as a central agenda for strategic planning and action? Signing up to accords and making declarations is common place within the sector but will education strategies be transformed as consequence? Past performance does not allow for optimism. Ensuring that higher education addresses the SDGs may involve the same challenges that implementing sustainable development has faced, with similarly slow responses and partial outcomes. On the other hand, a more optimistic view, would be that the SDGs serve to inspire engagement in ways that sustainable development might not have previously, thus, some institutions will recognise their potential to catalyse change and to reinvigorate sustainable development initiatives. If a few universities take this approach and lead by example, then others will follow.

This paper offers a case study of how one institution has seen the SDGs as a catalyst, offering insights into how the SDG framework might serve as a vehicle to step-up engagement with education for sustainable development, and to take institutional strategy further.

2 Universities, Sustainable Development and the SDGs

The critical role of universities in relation to sustainable development has been consistently articulated over recent decades (see for example, ‘The Sustainable University’, Sterling et al. 2013). Sustainable development (in higher education) has become a significant field of research (Barth and Rieckmann 2013), to the extent that examples of what constitutes effective engagement and the many hurdles to progress, are now well documented.

As far as universities’ practical engagement with sustainable development, considerable progress has been achieved in a sector that was described as notoriously resistant to change (Wals and Blewitt 2010) and where, for many years, engagement with sustainable development was deplored as both slow and inadequate (Tilbury 2013). In 2018, most universities now address environmental sustainability and/or sustain-

able development in some form; most will address campus sustainability and many highlight their green credentials on their institutional websites. However, while it is widely recognised that sustainable development needs to be addressed in research, campus, education and community, fewer universities have actually found ways to embed education for sustainable development across the entire curriculum (Shiel and Paço 2012), very few will evidence integrative or holistic approaches to sustainability (Leal Filho et al. 2015). Only some institutions meet the criteria for the title ‘The Sustainable University’ (Sterling et al. 2013). Across the world, and particularly in the UK, it is quite evident that while many universities have exemplified ‘campus-greening’, focused on environmental management, and are very good at promoting their green credentials, integrative approaches to sustainable development are hard to achieve and less common (Leal Filho et al. 2015).

This paper is set in the context that there is still much more to be achieved (Amaral et al. 2015; Brennan et al. 2015) if higher education is to make a full contribution to sustainable development. As the UK report on sustainability in education shows (National Union of Students (NUS) et al. 2017), leaders recognise that sustainability is a priority but are still failing to deliver. The biggest barriers identified in the report are: finances, lack of senior management commitment and strategic direction and lack of staff resources. In summary, progress to date has been slow, there is further to go and the SDGs may be a way to accelerate wider engagement.

3 The Goals and Higher Education

The SDGs represent an expanded follow-on, from the eight Millennium Development Goals (MDGs) which sought to “end poverty in all its forms” (United Nations 2015, p. 2). While some good progress was made towards the MDGs (which expired in 2015) they were never fully achieved; they had very little impact (beyond a research agenda and taught as a topic on a limited number of programmes) on the day-to-day activity of higher education. Sachs (2012) provides a useful summary of development, from the MDGs to the SDGs, the latter seek a shared focus on economic, environmental, and social goals as a hallmark of sustainable development. As the SDGs emerged following rigorous and extensive consultation, they constitute a broad consensus on which the world can build through cooperation between stakeholders. Although they are not legally binding, they are likely to be a major influencer on governments and organisations over the next fifteen years.

The United Nations (2015, p. 14) articulates the 17 goals:

- Goal 1. End poverty in all its forms everywhere
- Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture
- Goal 3. Ensure healthy lives and promote well-being for all at all ages
- Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

- Goal 5. Achieve gender equality and empower all women and girls
- Goal 6. Ensure availability and sustainable management of water and sanitation for all
- Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all
- Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
- Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
- Goal 10. Reduce inequality within and among countries
- Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable
- Goal 12. Ensure sustainable consumption and production patterns
- Goal 13. Take urgent action to combat climate change and its impacts*
- Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development
- Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
- Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
- Goal 17. Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Of the seventeen SDGs, only Goal 4 explicitly references education however Mader and Rammel (2015) suggest that universities have a much wider transformative role to play to achieve sustainable development. In their opinion, the most pertinent SDGs for education are Goals 4, 9, 12, 16 and 17. Although they highlight specifically just five goals, what is of overarching importance is that all students need to understand the implications of the entirety of the framework; all students need to develop the knowledge and skills required to live sustainably, within environmental limits. Further, meeting the SDGs will require universities to provide appropriately skilled graduates (Association of Commonwealth Universities 2015) and this will require rethinking the curriculum. Dramatically more globally relevant curricula are needed in all countries if students are to meet employability requirements and to address the social, environmental cultural, economic and health challenges that the world faces (Hall and Tandon 2013).

An inspiring publication by the Sustainable Development Solutions Network in the Pacific Rim (SDSN Australia/Pacific 2017) exemplifies what needs to happen in regard to the SDGs. The paper reinforces that universities (as knowledge creators) must play a vital role in developing those who will be the current and future implementers of the SDGs; “Addressing the challenges of the SDGs will require new knowledge, new ways of doing things, hard choices between competing options, and in some cases profound transformations” (p. 8). Further, the paper suggests that an

extensive contribution involves universities embodying the SDGs through organisational governance, operations and culture, as well as using their leadership role to influence partners and stakeholders in the community. The paper (p. 9) also sets out why universities need the SDGs: to demonstrate impact; capture demand for SDG related education; to build new partnerships and to access new funding streams.

Their guide is to be applauded and suggests that what is required for the SDGs is a strategic and integrative approach to sustainability, as has been argued previously for sustainable development (e.g. Leal Filho et al. 2015; Sterling et al. 2013)—through research, across the curriculum and in the extra-curricular sphere, and through working in the community to educate and encourage capacity building.

There are currently only a few early adopters of such an approach. One of the partners in the Pacific Rim collaboration, Victoria University of Wellington, New Zealand for example, has already mapped their current curriculum against the SDGs with the aim to track their own contributions towards the global goals and improve their offerings (Wilks and Van den Belt 2017). Similarly in the UK, the University of the West of England (UWE) is leading the way in taking a strategic approach to the SDGs and undertaking curriculum mapping to establish a benchmark for progress (Gough and Longhurst 2018), as is Nottingham Trent University (Willats et al. 2018) however, these examples are uncommon.

The 2017 Green Gown Awards UK and Ireland, a scheme delivered by the Environmental Association for Universities and Colleges (EAUC) that recognises exceptional sustainability initiatives undertaken by university and colleagues, tasked applicants with mapping the SDGs that their projects were delivering against. Canterbury Christ Church University emerged as another example of how a strategic approach to sustainability is transforming their University, both operationally and academically, and The London School of Economics and Political Science stated that sustainability was a fundamental strand running through teaching, research, operations and public engagement (EAUC 2017). However, not even at this high level of awards, was it possible to see that a strategic and integrative approach to the SDGs is commonplace.

In the UK, 75% of student respondents in the National Union of Students (NUS) et al. (2017) annual sector survey, reported that their institution had progressed action linked to the United Nation's SDGs initiative, seeing the SDGs as the biggest motivator of the initiatives listed. However, institutional innovators are in the minority and, there are few examples of how institutions are implementing their approaches. Further, there is no evidence yet of the impact or success of approaches. More examples are needed to share practice and particularly to extend conversations about aligning strategy with the SDGs in a higher education setting in order to build momentum for change.

4 Method

This paper adopts a case study approach (Yin 2014), and represents an empirical inquiry into sustainable development progress within a particular setting, the case

study institution. Two sources of information have informed the case study: literature related to higher education, sustainable development and the SDGs; and reflection and analysis on the part of the authors, who are members of the case study university's Sustainability Strategy Group (SSG) but also champions of change. A single site case study obviously has limitations but learning from such cases is important to inform processes of systemic transformation across higher education (Sharp 2002); therein, rests the value of this paper, case studies are useful in that they demonstrate to others possibilities and challenges. They are particularly pertinent in the early stages of developments such as engaging with the SDGs within an HE setting, where examples of practice may inspire others to follow similar paths.

5 The Case Study Context: Sustainable Development at BU

Bournemouth University (BU) has consistently aimed for an integrative approach to sustainability and was one of the first institutions that sought to explore a holistic approach, the challenges of which have been documented (see Shiel and Williams 2014; Shiel and Smith 2017).

The institution (BU) is a medium-sized UK university, inaugurated in 1992, with around 19,000 students, 740 full-time equivalent academic staff and 846 professional and support staff. Environmental issues became a focus of attention at the end of the nineties with a concern for saving resources, particularly utilities. Engagement with the broader concept of sustainable development became a more strategic concern in 2005, when a strategy was developed for the whole institution; from 2006, strategy embraced both global citizenship and sustainability (Shiel 2007) with education for sustainable development becoming a curriculum requirement. The importance of a holistic approach and integrative ways of working on over-lapping agendas (Shiel et al. 2005) was established at the outset but has never been fully achieved or easy to reinforce (Shiel 2011). However the driver has been to implement an approach not dissimilar to the "4C" model (curriculum, campus, community and culture) at Plymouth University (Jones et al. 2010, p. 7). The strategic vision for the university up to 2018, has made a clear commitment to "a holistic approach" to sustainable development, with the aim of "inspiring our students, graduates and staff to enrich the world", and the assurance that: "we will ensure our environmental credentials are held in high esteem" (Bournemouth University 2012). Substantial progress has been made over the course of the strategy and BU is perceived as one of the greener universities in the UK, with a 'first-class' award, consistently maintained in the UK Green League (People and Planet 2017). Campus sustainability is such that the estates at BU provide a very good 'Living Lab' environment where students learn from and contribute to campus greening approaches.

In 2016, a number of actions were pursued to achieve a "step change" in progress, and to reinforce a holistic approach:

- Achieving the highest credential to exemplify best practice in the environmental management of the University (i.e. EcoCampus Platinum and ISO14001 certification)
- Reinvigorating the education agenda
- Developing the culture and building capacity by working in the extra-curricular sphere—initiating Green Impact teams across the university (Shiel and Smith 2017).

The actions resulted in partial success.

EcoCampus Platinum (EcoCampus 2018) and ISO14001:2004 (International Organization for Standardization (ISO) 2015) certification was achieved in 2016 and BU became, at that time, one of only 15 universities with this dual certification. EcoCampus was designed by the higher education sector to help universities implement environmental management systems (EMS). An EMS is a risk management tool to minimise the impact on the environment whilst also promoting positive impacts, such as Education for Sustainable Development (ESD). BU's EMS currently provides a structured approach, supported by senior management, to continual improvement with its ESD programme.

Reinvigorating the education for sustainable development (ESD) agenda involved working with the Centre of Excellence in Learning (CEL) and gaining approval of a sustainability focus on the Post Graduate Certificate in Education (PGCert), which is compulsory for new staff. In 2017, this took the limited form of a one-off presentation to staff on the PGCert. The presentation created some interest but was perceived as a bolt-on, with limited impact on wider curriculum change. Similarly, a competition to surface good ESD teaching practise (again in collaboration with CEL) made public a few excellent examples, but mainly only gained the participation of already engaged academics, rather than serving to inspire the wider body of staff.

Another area where academics appeared not to be engaging related to the Green Impact programme, which had been introduced at BU in 2015. The programme involves staff working in teams within their departments to complete a workbook of actions covering several aspects of sustainability. The more actions completed, the more points are gained, leading to a Bronze, Silver, Gold or Platinum award. In 2017, four teams gained awards, with three at Silver and one at Bronze but three of the four teams were based in administrative functions, with only one academic team participating since 2015. Efforts to extend the programme have secured an increase in the number of teams (14 teams in 2017/18), however academic teams are still in the minority. Other universities (e.g. the University of Sheffield) have had greater success in securing academic staff participation in the programme, demonstrating that at BU, there is potential for further improvement. A survey investigating the barriers to pro-environmental behaviours at BU, including participation into the green impact programme, highlighted that the biggest barriers facing staff were: lack of time, funding and organisational support (Scarborough and Cantarello 2018). This echoes some of the barriers identified by the National Union of Students (NUS) et al. (2017) in their sustainability in education report. However, it is interesting to note that while time was the most highly reported barrier at BU, this barrier is

only listed in position six in the NUS report; this suggests that incorporating green impact participation into staff workload could provide an effective solution for BU to encourage more staff to adopt pro-environmental behaviours and so, where more staff lead through example, more students might be encouraged to follow.

In early 2017, it seemed to be the case that while considerable progress was being achieved in relation to campus greening, community engagement and sustainability research, since achieving ISO 14001, the ESD agenda was lagging; securing staff commitment and interest was continuing to be a challenge. In essence a different approach was required to engage academic colleagues.

6 A Further Shift of Approach: Aligning with the SDGs

As a consequence of ESD being incorporated into the EMS and hence an item on the 'risk register', it became an agenda item for the SSG. This was an important turning point highlighting the need to try other approaches. The group evaluated ESD as at 'high risk' of not being achieved. The main reason for this decision was the lack of evidence that sustainability had been embedded in courses further obtaining robust and objective evidence to report on the extent to which it had been embedded, was likely to be challenging. Other Universities, such as the University of Winchester, have addressed how to embed and benchmark sustainability in the curriculum by signing up to the NUS Responsible Futures programme which provides a framework for implementing and reporting on ESD (NUS 2017). BU had not participated in such a scheme.

Discussion on how to move forward highlighted the importance of communication that appealed to all stakeholders. Communication of sustainability messages is key to engaging with academics (Djordjevic and Cotton 2011) and to culture change. SSG recognised the potential of focusing communication on the SDGs, as a vehicle to engage with a wider academic audience and to achieve greater adoption of ESD. This decision was based on the assumptions that: all staff might address one or more SDGs in their subjects; the topic might have greater appeal than ESD, given that some staff were unable to relate to sustainability, let alone ESD; others were finding it difficult to understand how their actions today are either directly or indirectly affecting the future of the planet to support human life; others struggled to connect taking personal responsibility for relatively simple actions, such as recycling, with protecting the environment. The SDGs would provide a different lens for people to understand and explore what sustainability means for them, plus the tangible ways they might help make a difference.

The first communication initiative took the form of an adaption of the earlier ESD competition: instead of requesting examples of ESD, academics were asked to submit case studies of where they incorporate the SDGs in their programmes. Disappointingly, the competition had less impact than anticipated but did allow for three excellent winning academic examples to be promoted. These included an academic who teaches Film and TV. She had incorporated the SDGs into two modules and

organised sustainable literacy training for staff in the Media and Communication Faculty. Another academic from the same Faculty had incorporated the SDGs into the assessment of a BA Film Language unit where students were required to produce a three minute film and consider the environmental sub-plot. A third academic from the Law Department, illustrated how ‘Advanced Criminal Law’ was concerned with the United Nation’s Goal Peace, Justice and Institutions (SDG 16). Further, in discussing types of gross human rights violations, the Goals regarding Inequalities (SDG 10) and Gender violence (SDG 5) were covered.

In parallel to the competition, it was decided to pursue a more strategic approach. This took three forms:

- Using EcoCampus and the new ISO14001:2015 standard to provide the framework for ESD
- Further and closer collaboration with the CEL Director to ensure ESD was promoted through central communication channels and became an agenda led by CEL
- Using the opportunity of institutional strategy development to embed the SDGs and ensure that they featured during strategy development processes.

As stated above, BU achieved certification to EcoCampus and ISO14001:2004 in 2016, following an external audit. The new version of ISO14001:2015 was launched in September 2015 (International Organization for Standardization (ISO) 2015) with organisations having three years to transition to the new standard. BU achieved the transition at the end of 2017. One of the key changes to the standard, the need to gain greater commitment and leadership from senior management to the EMS, has been of critical importance. This afforded an opportunity to encourage further engagement with senior management. The importance of this clause, which is now a central component of ISO14001:2015, was discussed by the University’s Leadership Team as part of implementing the new standard. It served to influence strategic discussion at an opportune moment—the University’s “BU 2018” strategy was coming to a close and the new strategy “BU2025” was in development. The perfect opportunity was provided to renew with leaders discussions around commitment to sustainable development but also to introduce the potential of the SDGs.

As a consequence, the new strategy “BU2025” incorporated into an early draft the following statements (Bournemouth University 2018):

- (i) Leadership and impact: Enhance our position as a sustainable organisation and manage the environmental impact of our actions.
- (ii) Support our staff from all parts of BU and students to take a responsible approach to the environment and sustainable development by:
 - including sustainable development in our programmes and support our staff and students to make responsible choices about their environmental impact
 - bringing together our academic work on environmental sustainability with our approach to the physical environment at BU
 - driving significant worldwide impact on sustainability and the environment through our strategic investment areas.