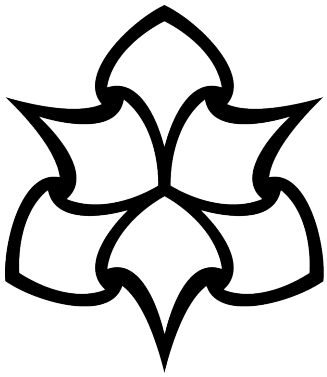

emerald PUBLISHING International Journal of Sustainability in Higher Education

Sustainable Development Policies as Indicators and Pre-Conditions for Sustainability Efforts at Universities: fact or fiction?

Journal:	*International Journal of Sustainability in Higher Education*
Manuscript ID	IJSHE-01-2017-0002.R3
Manuscript Type:	Research Paper
Keywords:	sustainability, higher education, efforts, effectiveness, policies

Sustainable Development Policies as Indicators and Pre-Conditions for Sustainability Efforts at Universities: fact or fiction?

Walter Leal Filho[a], Luciana L. Brandli[b*], Deisi Becker[c], Constantina Skanavis[d], Aristea Kounani[e], Chrysoula Sardi[f], Dimitra Papaioannidou[g], Arminda Paco[h], Ulisses M. Azeiteiro[i], Luiza de Sousa[j], Schalk Raath[k], Rudi Pretorius[l], Chris Shiel[m], Valeria Vargas[n], Gregory Trencher[o], Robert W. Marans [p]

[a] School of Science and the Environment. Manchester Metropolitan University. All Saints Building. Oxford Road. Manchester M15 6BH. UK. E-mail: w.leal@mmu.ac.uk

[b*] Architecture and Engineering College. University of Passo Fundo,CAMPUS I, Km 171,BR 285,Passo Fundo/RS. Brazil. E-mail: brandli@upf.br (*corresponding autor)

[c] Management School. Federal University of Rio Grande do Sul (UFRGS). Washington Luiz, 855. 90.010-460 Porto Alegre/RS. Brazil. E-mail: deisibecker@bol.com.br

[d] Research Center of Environmental Communication and Education. Department of Environment University of the Aegean. University Hill Mytilene, 81100 Greece E-mail: cskanav@aegean.gr

[e] Research Center of Environmental Communication and Education. Department of Environment University of the Aegean. University Hill. Mytilene, 81100. Greece. E-mail: kounani@env.aegean.gr

[f] Research Center of Environmental Communication and Education. Department of Environment University of the Aegean. University Hill. Mytilene, 81100. Greece. E-mail: env12078@env.aegean.gr

[g] Research Center of Environmental Communication and Education. Department of Environment University of the Aegean. University Hill. Mytilene, 81100. Greece. E-mail: env12068@env.aegean.gr

[h] Department of Business and Economics, Research Unit NECE, University of Beira Interior, Estrada do Sineiro, 6200-209 Covilhã, Portugal. E-mail: apaco@ubi.pt

[i] Department of Biology & CESAM Centre for Environmental and Marine Studies, University of Aveiro, 3810-193 Aveiro, Portugal. E-mail ulisses@ua.pt

[j] Geography Education and Environmental Education. School of Natural Sciences and Technology for Education. Faculty of Education Sciences. North-West University (Potchefstroom Campus). South Africa. E-mail: Luiza.desousa@nwu.ac.za

[k] School of Natural Sciences and Technology for Education. Faculty of Education Sciences. North-West University (Potchefstroom Campus). South Africa. E-mail: Schalk.Raath@nwu.ac.za

[l] Department of Geography, University of South Africa, Room 035, Calabash, Science Campus, Pretoria, South Africa E-mail: pretorw@unisa.ac.za

[m] University of Bournemouth, Christchurch House C212, Talbot Campus, Fern Barrow, Poole, BH12 5BB, UK. E-mail: cshiel@bournemouth.ac.uk

[n] School of Science and the Environment Manchester Metropolitan University. All Saints Building Oxford Road. Manchester M15 6BH UK. E-mail: v.vargas@mmu.ac.uk

[o] Department of International Development, Community and Environment. Clark University. 950 Main Street Worcester MA 01610. USA. E-mail:gtrencher@clarku.edu

[p] Institute for Social Research. University of Michigan. Ann Arbor Michigan.48106 U.S.A. E-mail: marans@umich.edu

Abstract

Purpose - There is a widely held belief that Sustainable Development (SD) policies are essential for universities to successfully engage in matters related to sustainability, and are an indicator of the extent to which they are active in this field. This paper examines the evidence which currently exists to support this assumption. It surveys a sample of universities in Brazil, Germany, Greece, Portugal, South Africa, United Kingdom (UK) and United States of America (USA) to ascertain the extent to which universities that are active in the field of sustainable development have formal policies on sustainable development, and whether such policies are a pre-condition for successful sustainability efforts.

Design/methodology/approach –The study involved 35 universities in these seven countries (five universities respectively). A mixed-methods approach has been used, ranging from document analysis, website analysis, questionnaires and interviewing.

Findings – Although only 60% of the sampled universities had a policy that specifically addressed SD, this cannot be regarded as an indicator that the remaining 40% are not engaged with substantial actions that address SD. Indeed, all of the universities in the sample, regardless of the existence of a SD formal policy, demonstrated engagement with environmental sustainability policies or procedures in some form or another. This research has been limited by the availability and ability to procure information from the sampled universities. Despite this, it is one of the largest research efforts of this kind ever performed.
Originality/value – Our findings provide some valuable insights about the connections between SD policies on the one hand, and the practice of SD in higher education institutions on the other.
Key words: Sustainability, Higher Education, Policies, Efforts, Effectiveness

Received 03-Jan-2017
Revised 11-Apr-2017.

1. Introduction

Sustainable Development (SD) at universities is a rapidly emerging field (Leal Filho, 1996; Leal Filho, 2012). Whereas in the 1980s only a few universities considered sustainability to be relevant to their activities, there are currently thousands of universities around the world that regard sustainability as relevant or even central to their activities (Lozano, 2011).

This is not to say that the implementation of SD initiatives at universities is not without complications. On the contrary, there are many barriers that prevent it from being fully implemented, with one significant trend being a lack of institutional sustainability policies. The many efforts performed throughout the UN (United Nations) Decade on Education for Sustainable Development have not changed this trend significantly (Leal Filho et al., 2015a). On the contrary: the recently set "Sustainable Development Goals" call for more institutional commitment and a wider use of indicators to measure progress (Hák et al., 2016).

It is evident that, over the years, incentives for establishing SD-oriented curricula, for research, social initiatives and other actions related to SD have increased. Attention is often concentrated on the first steps, i.e. starting a sustainability initiative, and "there has been much less attention given to establishing how to ensure [these] desired developments are successfully initiated, implemented and sustained" (Mader et al., 2013, p. 265).

The quest to evaluate and encourage the engagement of universities in SD efforts is a complex and extensive one. Sustainability policies at universities are important, since they offer a basis for systematic (i.e., not ad hoc or loose) initiatives across the institution. According to Too and Bajracharya (2015), with universities being generators of cutting-edge research, they can be expected to be leaders of new and innovative sustainable practices. Sustainability policies at universities are important and cannot be dismissed. Policies need to address the existing gaps, promote new solutions and new ways to make institutions more efficient, and to reduce the footprint of their activities.

The purpose of this paper is to examine the evidence that may exist to support the assumption that SD policies are essential for universities to successfully engage in matters related to sustainability, and to consider if such policies are an indicator – or a pre-condition - for successful sustainability efforts. The findings are based on a sample of universities from Brazil, Germany, Greece, Portugal, South Africa, UK and USA.

2. Sustainability in the university community

A university is formed by a community of individuals and its operations entail a wide range of facilities and activities. These include dormitories, restaurants, and all of the associated waste that they generate, chemicals that they consume, energy that they use, and much more. According to Amaral et al. (2015, p. 160), "despite the fact that operational initiatives can be seen as worthy examples of sustainable practices, they cannot by themselves be a guarantee of campus sustainability. They lack a systematic and continuous quality improvement approach that is the core of the standardised management systems".

In this sense, the university community has much to learn. Faculty, students and staff need to engage in real problem-understanding and problem-solving, and ensure that their universities become a pivotal force to guide wider community efforts to advance societal sustainability (Trencher et al., 2014). However, changing attitudes and behaviours is a complex and challenging task. Recent research findings suggest that it takes more than just information dissemination to influence and change attitudes (Too and Bajracharya, 2015). These authors provide two examples about community engagement and the need for a holistic approach to engage any community in SD including education, governance and actions.

The examples of university activities provided on a study by Amaral et al. (2015) attest the relevance that various HEIs are giving to sustainability. Their examination includes examples from institutions certified according to ISO 14001 (i.e. University of Glamorgan, University of Melbourne, Mälardalen University and University of Gävle), and those currently using ISO 14001 only as a performance indicator (e.g. Lincoln University, New Zealand or Dalhousie University in Canada). According to Amaral: "Universities are a unique type of organization, as they need to address not only all three dimensions of sustainability (economic, environmental and social) but also the five dimensions of their organizational activity (education, research, operations, community outreach, and reporting)" (Amaral et al., 2015, p. 162).

But there are many other examples. At the University of British Columbia (UBC), for instance, SD issues are centrally placed in the university curriculum and overall philosophy. Indeed, UBC has a history of pursuing strong operational sustainability goals and targets. It emphasises teaching and research on sustainability, and has committed, at the corporate level, to the deep integration of

operational and academic efforts in sustainability. For example, the UBC Sustainability Initiative (USI), established in 2010, is the University's agent in this innovation. USI fosters partnerships and collaborations that extend beyond traditional boundaries of disciplines, sectors and geographies to address the critical issues of our time. The initiative's work is carried out under two crosscutting themes: campus as a living laboratory and the university as an agent of change (University of British Columbia, 2015).

Still in North America, Yale University offers another example of a strong institutional commitment to sustainability. Various university-wide sustainability efforts have been guided by strategic planning documents, designed to look comprehensively across divisions and involve all members of the university. For instance, the current Sustainability Strategic Plan (2013-2016) includes five major focus areas to address sustainability issues even more systematically and with a broader reach across campus (Yale University, 2015).

At the Polytechnic University of Catalonia (UPC), the University Research Institute for Sustainability Science and Technology (IS.UPC) promotes and carries out research on sustainability and generates technical and conceptual tools to create a more sustainable production model.

At the University of Uppsala, in Sweden, the Uppsala Centre for Sustainable Development coordinates some initiatives in this field. It is an interdisciplinary Centre based on a collaboration between Uppsala University and the Swedish University of Agricultural Sciences, both in the same city. The Uppsala Centre aims to be a catalyst for research and education on SD at the two universities.

In Brazil, exploratory research was conducted to map the emphasis given to SD by 40 federal universities, which represent 89% of the programs offered in Brazil. This study concluded that the inclusion of new courses involving sustainability in business administration programs is still irregular and slow. Of the 40 universities investigated, only 13 (roughly a third) offered courses related to the topic (Palma et al., 2011).

Reaching off campus, research suggests that universities are increasingly willing to consider joint pursuit of sustainability with societal stakeholders (i.e. sustainability co-creation) as a core mission (Trencher et al., 2104; Zilahy and Huisingh, 2009). Many examples demonstrate how sustainability co-creation can enrich research and education through real-world challenges and transdisciplinary knowledge production (Trencher et al., 2016). However, it also suggests that numerous barriers discourage faculty from working with societal stakeholders, some of them related to the academic incentives system (Trencher et al., 2014).

All of these examples make it clear that SD at universities is here to stay. Yet they also emphasise that there is a need for refurbishment and adjustments. SD policy needs to be incorporated to improve the management of all resources, community relations and the dissemination of new practices and innovations.

3. The role of sustainable development policies at universities

As many Higher Education Institutions (HEIs) across the world have become increasingly aware of their impact on the environment, they have made substantial efforts to enhance their understanding of the environmental dimensions of their operations and the implications and impacts of higher education activities (Carpenter and Meehan, 2002). Additionally, the number of HEIs that are incorporating and institutionalising SD into their practices reflects an upward trend, evidenced by the growth of sustainability coordinators and environmental managers within universities. It might be expected that policies to address SD are both a cause and a consequence of such growth and a reflection of the number of endorsements made by Vice Chancellors and University Presidents to International Declarations that declare their commitment to SD (see Tilbury, 2013, p.13). There has certainly been a parallel increase in policy development. Yet what is less clear is whether such policies reflect the broader concerns of SD (and address effectively what Vice Chancellors signed up to), or whether such policies address more limited and specifically environmental concerns. These would include for example addressing carbon reduction, conserving energy; complying with environmental legislation; and, reducing the costs of running the estates, while also developing green infrastructure that is more attractive and marketable to prospective students.

What is clear, however, is that "campus greening" has become mainstream. The number of international networks and partnerships for SD in higher education is testament to this (Radford, 2012). Thus, in most universities around the world, there are numerous, innovative examples of environmental initiatives related to green building design; recycling and reusing; energy efficient lighting; water conserving fittings; and public transportation.

Whether the pre-occupation with campus greening is a result of environmental policies or other factors remains to be seen. It is possible that campus greening initiatives have emerged in spite of limited or flawed strategies and policies. They might suggest that something is missing from the policy development process; that it is easier to green the campus but more challenging to embrace the wider potential of Education for Sustainable Development (ESD). Alternatively, it may say something about the way institutions, and particularly those who establish policy (i.e. the senior teams) have engaged or not.

A trawl of higher education websites (particularly in the USA and UK) will quickly demonstrate that most institutions have an "environmental policy"; which many proactively and proudly market as "green credentials". However, research suggests that there are fewer examples of universities that have genuinely demonstrated a systemic commitment to SD (Sterling et al., 2013). Examples of integrative approaches and "third wave sustainability" where universities "re-orient teaching, learning, research and university-community relationships" (Wals and Blewitt, 2010, p.56) in such a way that

sustainability becomes a core driver are uncommon, and are not often pursued, despite their potential (Leal Filho et al., 2015b).

It is therefore highly unlikely that the majority of universities will have "official" policies that encompass the full remit of what is implied by SD. Consequently, it is highly probable that universities have well-developed policies related to the environmental management of their estates, with goals in relation to physical infrastructures, operations, carbon reduction, etc. Conversely, they will be less likely to have an overarching strategy and policy for SD which embraces all the component parts (and wider concerns) with sub-policies that flow from that. Also, they are very unlikely to have thought strategically about the "needs of future generations" and to have adopted policies that take a sufficiently long-term perspective into consideration.

This may seem surprising given the number of international declarations endorsed. As Radford (2012) notes, these voluntary, not compulsory and voluntary endorsements do not always result in immediate action. This is worrying given the substantial number of authors who have highlighted the critical socio-economic and natural environment crises that the world faces, with a challenging responsibility falling to higher education (Ciferri and Lombardi, 2009). Universities are called upon to develop systemic approaches to address these problems, and to play a leadership role in the development of interventions that will be crucial to the survival of the planet and of humanity, through research, education, and community engagement (Shiel et al. 2016; Trencher et al., 2014). Given their resources, they are ideally placed to showcase environmental management and innovative environmental practice. However, current paradigms may be inadequate for addressing the long term needs of a sustainable future. Current strategies and policies in particular may fall short of achieving the desired outcomes, where it is very clear that integrative ways of working need to be achieved (Leal Filho et al. 2015b).

Strategy and policy development (to ensure strategy becomes meaningful) needs to encourage, as Ciferri and Lombardi (2009) suggest, new thinking within the educational system and to ensure that universities:

- Contribute to models of economic growth consistent with SD;
- Focus on interdependence within ecosystems (exploring and educating students and society about the nature of this interdependence is critical to establishing the ecosystems which impact on SD. Additionally, education is crucial in disaster risk reduction strategies);
- Develop new approaches to sustainable energy (with a focus not only on preventing over-exploitation of resources or limiting pollution, but also on the provision of alternatives).

Policies must ensure that broader concerns are fully addressed. Lozano et al. (2013) propose the following elements that need to be considered (and thus embraced) within policy: curricula, research, campus operations, community outreach, university collaboration, assessment and reporting,

transdisciplinarity, embedding SD into the institutional framework, embedding SD in the daily campus experience, and educating the educators. Potentially, each of these areas could be covered in an over-arching SD strategy and policy. However some will require focused initiatives, and might be better implemented through sub-policies with the proviso that the institution develops frameworks to ensure that sub-policies do not result in fragmented ways of working. Yet this would fly in the face of a need for "integrative approaches" (Leal Filho et al., 2015b).

Policy development and implementation of initiatives will only ever be possible with the support of the senior team (Shiel and Williams, 2015). Not only must senior staff endorse policy but they must also lead by example. Unfortunately senior leaders who fully understand SD are uncommon (Shiel and Jones, 2016). Thus, until there is more leadership for SD at a senior level, policy development and implementation is unlikely to be no more than partial. A further problem is that senior leaders too often discharge responsibility for SD to the environment team in the estates function of the university. Environmental managers have led some excellent projects across the sector. Yet when ownership of the agenda is transferred to a professional service function, this creates barriers to broader engagement. It can potentially restrict the conception of SD, clarification of responsibilities, and the development of holistic approaches. The need for senior support is reinforced by the recent report from the Environmental Association for Universities and Colleges (EAUC, 2015). Respondents identify the top two priorities as 1) addressing sustainability at senior level and 2) embedding SD in the curriculum. Many of the respondents also reported that responsibility for SD sat with either estates or finance. While environmental manager's ownership of the agenda has certainly contributed towards carbon reduction and campus greening, it is unlikely to facilitate the development of policy that impacts across the institution and holistically addresses the curriculum, community engagement and research etc. Given the academic/professional services divide (Shiel and Williams, 2015), this may inhibit the sort of policy development that universities need for a paradigm shift. It may result in policy that is no more than a strategy for the environmental management of the physical estate.

Ambition is required to develop policy explicitly for SD, which encompasses the breadth of concerns, focuses on the scale and urgency of the issues, and is informed by a consideration of a long-term perspective (unlike the usual 3-5 year planning cycles). Such policies need to be driven and endorsed by the senior team and owned by the entire academic community rather than discharged once ownership has been attributed.

The increase in policy development aiming to address SD is a cause and a consequence of the growing number of HEIs incorporating SD practices. However, such policies often do not reflect the broader concerns of SD; instead, they are more likely to address specific environmental issues (e.g. carbon reduction, conserving energy). This reveals that a more holistic approach may be missing in the policy development process.

4. Factors influencing the implementation of sustainable development policies at university level

SD at university level, as a principle and practice, is strongly connected to environmental, socio-political and economic factors and the related impacts of these on our everyday life. The establishment of a SD university policy is rooted to our commitment to make a positive difference in our world. In a number of international professional meetings and declarations, the promotion of SD has been identified as a key concept to address the environmental crisis. Furthermore, the introduction of education has been concluded as a central component for achieving a sustainable world (Zachariou et al., 2008).

A sustainable school is based on characteristics such as having programs that promote and evaluate ESD principles, incorporating national ESD strategies, and identifying key quality criteria that can be used by schools as a means to promote ESD (Mogesen and Mayer, 2005). All of these, once in effect, are factors that frame a university as sustainable. Universities carry an extra responsibility to support SD since they are key players in the training of future decision makers. Therefore, the extent to which universities prepare students to be able to integrate social, environmental and economic considerations into future decision-making influences the implementation of a campus SD policy (Lozano et al., 2013). Necessary competencies for future decision makers include the capacity to be able to, through education, interpret the complexities of sustainability into systemic, anticipatory and critical thinking and actions. There are pressures on university identities to integrate SD into the functions of faculty and staff (Steiner et al., 2013) and not to have SD as a single course activity. Many programs for ESD have been adequate, but they commonly depend on isolated individual actions and not a community approach that connects SD to other discourses in education (Sammalisto et al., 2014).

With 17,000 universities in the world, higher education is a global enterprise operating collaboratively through the exchange of ideas, students and staff, having a privileged position to drive global change (HEFCE, 2013). The successful delivery of a higher education ESD strategy depends on the universities' understanding of SD. It is mandatory to have an in-house list of aims and objectives, in order to evaluate the obstacles that jeopardise the establishment of SD policy (St Andrews Un., 2012).

Incorporating sustainability into a university system presents challenges to education, research, operations and outreach (Velazquez et al, 2006). It also creates opportunities for HEIs to implement effective assessment and reporting systems to track their progress in incorporating sustainability concepts and approaches throughout their systems (Lozano, 2006). These challenges and opportunities will influence the activation of a SD policy. Several universities are engaging in fostering change by contributing to SD (Hansen and Lehman, 2006) although as a whole universities tend to be very conservative and resist change (Ferrer-Balas et al., 2010). Those investing into SD have recognized that their role is not only to educate future societal leaders, decision-makers, and intellectuals, but that they

themselves should be learning organizations practicing sustainability in education, research, outreach and campus facilities management (Ferrer-Balas et al., 2010).

As argued, the concepts of SD should be integrated into the policies, approaches and learning of all members of university stakeholders (administrators, faculty and students). In cases where SD is still not part of the culture, it is possible "to force" it from the top to the bottom through power-coercive strategies. However, this approach creates conflicts, which can weaken the implementation (Lozano, 2006).

Other constraints on implementing SD identified in the literature include the provision of information and the acquirement of knowledge, the level of community members' participation and cooperation (Disterheft et al., 2016), limitations from organisational structure, and finally, financial constraints (Evangelinos et al., 2009). Other highlighted barriers include the absence of quantitative indicators for monitoring the benefits and limitations deriving from environmental management initiatives and attempts to green the curriculum (Lidgren et al. 2006). This limited provision of information on environmental issues may have negative consequences on the efficiency of SD initiatives, influencing the gap between intentions, actual environmental behaviour and the efficacy of participation. A lack of information on environmental problems may be a major obstacle during environmental policy applications. This can, in turn, deprive the university community from experiencing the benefits that can be derived from environmental management initiatives (Evangelinos et al., 2009).

Resistance to change is –as earlier mentioned- another factor influencing the application of a SD policy at a university. The long-standing history of academic freedom, and the tradition of criticism and tenure are common cultural characteristics at universities that inherently resist change. This can particularly be a problem with more senior academics who have secured influence and prestige in academic systems adverse to disruptive change. However, a good number of junior academics strive to achieve acceptance, innovation and new ways of working (De la Harpe and Thomas, 2009).

Geography will often endow a campus with natural resource advantages such as land, wind and biomass. At the same time, others (e.g. entrepreneurial farmers and bankers) can have strong environmental interests and can possibly serve as qualified candidates for partnerships. The market power of the demands and needs of a campus itself leverages important initiatives in the energy and food markets. Furthermore, the relationships already in place with local politicians, local farmers, and others in the community become strong factors in the establishment of a university SD policy (Goodnough et al, 2009). As an additional consideration when developing campus-wide green curricula, there is a need for cooperation among different disciplines/departments to develop specific management and governance systems that counter the inertia and resistance of individual disciplines. Thus, change in universities is strongly connected to organizational politics. Achieving change must therefore work with university culture and particularly academic staff. The recognition of barriers to change helps one identify the types of action that are needed to ensure successful change efforts. The

implementation of SD policy is no exception to underlying university characteristics (De la Harpe and Thomas, 2009).

SD at university level, as a principle and practice, is mainly associated to environmental, socio-political and economic factors and the related repercussions of these on humans' daily life. The extent to which universities qualify students to integrate social, environmental and economic considerations into future decision-making determines the implementation of a campus SD policy (Lozano et al., 2013). Undoubtedly, incorporating sustainability into a university system demonstrates challenges to education, research, operations and outreach (Velazquez et al, 2006). It, also, generates opportunities for HEIs to execute efficacious assessment and reporting systems to track their progress in incorporating sustainability concepts and approaches throughout their systems (Lozano, 2006). These challenges and opportunities will influence the activation of a SD policy. On the other hand, the resistance to change is also a factor to have in mind. The long-standing history of academic freedom and the tradition of criticism and tenure, are common cultural characteristics at universities that inherently resist to new approaches in their everyday routine. Furthermore, the limited provision of information on environmental issues may have a toll on the lack of the SD initiatives efficiency, influencing the gap between intentions, actual environmental behaviour and the involvement in participation. The absence of information on environmental issues is also a tremendous obstacle during environmental policy applications (Evangelinos et al., 2009). Finally, the relationships between university and the local politicians, the farmers, and others in the community become potent factors in the establishment of a university SD policy (Goodnogh et al., 2009), since there is a necessity for productive cooperation among different disciplines/departments to explicate specific management and governance systems.

The recognition of barriers is of significant importance, since it enables one to identify the types of action that are required to ensure a successful change endeavour (De la Harpe and Thomas, 2009).

5. Methodology

In a paper on the identification and assessment of the implications of SD for the future orientation of higher education, and after the 2012 United Nations Conference on Sustainable Development, Beynaghi et al. (2014) pointed out that although sustainability assessments of universities have been conducted by numerous scholars with different points of view, an ideal assessment methodology has not yet been developed. In addition, comparisons of sustainability between universities seem to be particularly problematic, since existing methodologies are not very suitable for effective benchmarking (Madeira et al., 2011). Apart from this challenge, many methodologies are flawed in that some emphasise environmental and eco-efficiency, while simultaneously neglecting the social dimension. Similarly, others focused on education for SD while neglecting aspects that relate to the day-to-day

operation of institutions. Ideal methodologies should be holistic and equally reflect the different dimensions of sustainability. From the viewpoint of frameworks such as the "Sustainability in Higher Education Institutions", the SusHEI model of Madeira et al. (2011), assessment methodologies clearly need to touch on all internal dimensions of universities; namely governance, academic community, university operations, teaching and learning, research and community impacts. Depending on research aims and the specific institutions at stake, the level of detail required will vary. For example, sustainability and SD reporting generally requires less detail than when results are required for the purpose of internal management.

Corresponding to the different internal dimensions incorporated in the SusHEI model, a set of ten questions (see Table 1) was developed. This provides the framework to source information on various and broad dimensions of SD efforts at universities. Our approach was to paint both a quantitative and qualitative comparative picture of 35 universities, spanning seven countries (five universities from each). Our aim was twofold. First, to identify the presence or absence of policy components related to SD, and second, to obtain an indication of the stage of progression of policy development affecting a range of sustainability related initiatives. Analysis and comparisons of this data will provide insights into the influence of formal SD policies on university success in this field. This type of comparative analysis of SD policies at universities, conducted at both national and international level, holds more promise than a purely statistical analysis (Collier, 1993). The usefulness of statistical analyses for comparing policy components and related procedures and initiatives at different universities is constrained by numerous factors. These include the complexity of the sustainability aspects in policies, the variety of forms in which it may manifest, as well as differences in interpretation (Jordan et al., 2005). In illustration of this, there are many cases where aspects of sustainability policies or procedures are present, but not as a stand-alone formal policy or procedure. Additionally, issues relating to the validity and reliability of measures used in statistical comparisons (Lor, 2011) may further render the results of such analyses less useful.

Table 1: Framework for sourcing information on dimensions of participation in sustainable development at sampled universities

1	Does the sampled university have a formal SD policy?
2	Does the sampled university have procedures for campus greening (e.g. energy saving programmes, waste prevention and/ or management schemes, environmentally friendly dormitories, etc.)?
3	Does the sampled university have procedures for the integration of SD (SD) issues in the curriculum?
4	Does the sampled university have a systematically established SD network to link up staff?

5	Does the sampled university have procedures for training of staff on matters related to SD (e.g. formal series of seminars, guest lectures, courses, etc.)?
6	Does the sampled university have procedures for outreach on SD (e.g. public events, open seminars etc.)?
7	Does the sampled university have official procedures for SD considerations in purchases, awards of contracts, catering and other service areas?
8	Does the sampled university have official procedures for students' engagement on matters related to SD?
9	Does the sampled university have official procedures for joint SD activities with local actors (e.g. NGOs, municipality, regional government, etc.)?
10	Does the sampled university have official procedures for international networking on SD?

Sample selection and data collection

The choice of the seven countries was based on convenience sampling. It was determined by the presence and availability of collaborators to mutually conduct this investigation. Likewise, the choice of the five universities in each country depended on the access of the collaborators to universities who have, as first consideration, some form of sustainability policy in place (since the aim of the research is to determine the extent to which a formal policy on SD is a pre-condition for successful activities in this field). A second consideration was the availability of information on SD initiatives at such universities and/or the willingness to share such information. The choice of the five universities in each country therefore constituted a further convenience sample.

Sourcing of the relevant data commenced once the suitable universities were identified. A variety of methods was utilised, ranging from document and website analysis, questionnaires, and communications with key personnel. Since the importance of developing a common understanding of the questions among the collaborators was crucial for assuring the validity of comparisons between the results for each country, a substantial effort in this regard characterised the data collection phase. This took the form of a critical, open debate between the various collaborators. It was agreed that the requirement of a "policy" for SD should be adhered to rigorously, since many universities would indeed have activities or initiatives somewhere across campus that would cover many of the categories. Yet, it was argued, a much smaller number would have university-wide (or administratively supported) policies/strategies/programmes/commitments relevant to the individual questions in the framework.

For standardisation effects, responses to questions have been pinned in a straightforward manner as either "X" (yes) or "-" (no) in a top-down matrix. To facilitate comparison, responses are organised and reported as one completed matrix per country. The option to indicate a response as not specifically "yes" or "no" but as intermediate, was considered. Yet this was not implemented since it would introduce ambiguity into the results. According to Baumal and Oates (1988), a matrix approach is suitable for presenting information on environmental sustainability in a straightforward, standardised way so that targets can be set or assessed. The matrix used for this research measures the existence of the identified sustainability components at the different universities, while simultaneously facilitating comparisons between universities in one country, as well as between others. This type of classification may assist in simplifying the complexity associated with contextual descriptions and forms a baseline for cross-national comparisons (Landman, 2008), which is the intention with this research. Although challenging in terms of different institutional, cultural and other variables involved, collaborative research endeavours like this are important to provide insight into the implementation of SD policies in different institutional contexts worldwide, thus sharing best practice and learning from experience in search for common solutions.

Additionally, a statistical analysis was conducted to prove the relation between the variable SD policy (Var 1) and the others (Var 02 to Var 10). The Chi-square test of adhesion of (Siegel, 2016) was processed using the software IBM Statistic SPSS 23. This test is used to evaluate the association between two qualitative variables X and Y.

6. Results: presentation and discussion

The findings of the research are organised as follows. First, individual results on the participation of SD efforts at universities for each country are reported; namely Germany, Brazil, Greece, Portugal, South Africa, United Kingdom and United States. Next, a comparison of individual country results is provided and the statistical association between the variables is presented.

Country 1: Germany

In Germany, the five sampled universities are spread across the country, and represent both traditional universities, and universities of applied sciences, which are known to be more practice-based.

The sampled universities were HAW Hamburg, Leuphana Lüneburg, Munich University of Applied Sciences, University of Bremen, and University of Frankfurt.

As outlined in table 2, only two of the sampled universities (Leuphana and Munich) have a sustainability policy. The lack of such policies has been outlined in earlier works (Leal Filho, 1998) due to the strong emphasis given to environmental protection in the operations of universities. Although much progress has been made seen since 1998 in respect to sustainability research (Leal Filho, 2015), in terms of formal policies there is a weaker emphasis on sustainability.

Green campus procedures are more popular, with only one of the sampled universities lacking formal policies in this area. Provisions for SD in the curriculum were observed at Leuphana and Munich, while not at the other sampled organisations. As far as networking is concerned, all investigated universities reported formal procedures for this indicator, but this is not the case for SD and training, where only HAW Hamburg and Leuphana University have relevant provisions. SD Outreach does not seem to be practiced by Munich and Frankfurt, whereas HAW Hamburg seems to be the one strongly emphasising sustainability issues with regards to its procurement framework. The engagement of students is only visibly strong at Leuphana and Munich, which shows that much still has to be done in this field at the other institutions. All sampled universities have indicated that they are engaged in local and regional SD initiatives, and in international networking.

Table 2- Results from Germany

Item	HAW Hamburg (founded 1970; 16.000 students	Leuphana University (founded 1946; 9.239 students	Munich University of Applied Sciences (founded 1971, 17.000 students)	University of Bremen (founded 1971, 19.600 students)	University of Frankfurt (founded 1914, 46.613 students)
SD policy	-	X	X	-	-
Green campus procedures	X	X	X	X	
SD in the curriculum	-	X	X	-	-
SD and Networking	X	X	X	X	X
SD and Training	X	X	-	-	-
SD and Outreach	X	X	-	X	-
SD and Procurement	X	-	-	-	-
SD and students´engagement	-	X	X	-	-
Joint local/regional SD activities	X	X	X	X	X
International networking on SD	X	X	X	X	X

Country 2: Brazil

In Brazil, the sample consists of four public institutions (Federal University of Rio Grande do Sul, Federal University of Santa Maria, University of Brasilia and University of São Paulo) and one private. The University of Rio dos Sinos is the first university to obtain a ISO 14001 certificate in Latin America (Venzke et al. 2012), and remains the only one in Brazil.

In Brazil, SD in universities has been underdeveloped, although in recent years many more universities have become engaged, with most universities having at least one initiative in this area. Yet as noted by Brandli et al. (2015), there are barriers to overcome concerning the process of incorporating sustainability, cultural change and the current context of the country in terms of SD.

Turning to results, two universities have formal SD policies (UFRGS and UNISINOS), and one is discussing policy (USP). Green campus procedures were observed in four institutions. These procedures encompass universities waste management, energy and water saving, eco-efficiency, sustainable construction and transport. The integration of SD into the curriculum is present in all sampled universities, but occurs at different levels depending on the course (topics or disciplines focused on SD). This is an example of isolated initiatives and not a strategic or institutional vision.

Formally established, SD networks applied to two Brazilian universities. One of them, USP, has a formal network amongst the campus articulating their staff on "USP recycles". The other one, UnB, aims fostering environmental projects.

For SD and Training, four universities have procedures for training staff about SD, yet only two had formal procedures for SD and Outreach. Official procedures for SD and Procurement and the environmental performance of suppliers were widely observed, and were present in four institutions. Procedures for SD and students' engagement were lacking. UnB, the only university with procedures for this, cites the existence of the Student Committee for the Environment, which brings together students from various courses, and Academic Centers that promote weekly activities focused on sustainability. Lastly, most sampled universities have Joint local/regional SD activities in formal procedures but International networking on SD was found to be still incipient in Brazilian universities.

Table 3- Results from Brazil

Item	Federal University of Rio Grande do Sul (founded 1895, 24.000 students)	University of Rio dos Sinos (founded 1969, 23.000 students)	Federal University of Santa Maria (founded 1960 31.000 students)	University of Brasilia (founded 1962, 38.475 students)	University of São Paulo (founded 1934, 57.000 students)
SD policy	X	X	-	-	-
Green campus procedures	X	X	-	X	X
SD in the curriculum	X	X	X	X	X
SD and Networking	-	-	-	X	X
SD and Training	X	X	-	X	X
SD and Outreach	-	-	X	X	-
SD and Procurement	X	X	X	X	-
SD and students´engagement	-	-	-	X	-
Joint local/regional SD activities	X	-	X	X	X
International networking on SD	-	-	-	-	-

Country 3: Greece

The sampled universities are located in Northern Greece (University of Macedonia, Aristotle University of Thessaloniki), Southern Greece (University of Crete), Central Greece (National Technical University of Athens) and the Greek islands' region (University of the Aegean).

In Greek universities, once the planning process is finalised, a sustainable development policy needs to be approved by each university's senate body. The universities chosen to be part of this research project have put together a Sustainable Development Plan, but these are not yet in implementation. The University of Macedonia is the one exception, with a sustainable policy established by their own senate. It should be emphasised that the majority of the participants do not feel familiar with the term 'sustainability'. There is a misunderstanding between being "green" and having a SD policy, which must secure the vote of the senate. Interestingly though, most of the surveyed universities have a variety of general "green" activities in their daily operations. Environmental sustainability content courses are offered and research related to environmental topics is being actively pursued. Furthermore, students are given incentives to participate and are even awarded for their distinct contributions to SD.

The positive responses to several sustainable activities are overseen by Offices of Environmental Management. Additionally, one common point in surveyed universities is the lack of training programmes both for staff/faculty and students. Previous research (Bellou et al., 2017) has pointed out that non-academic staff's intentions towards the implementation of sustainability programs at the University of the Aegean are positive. Although there is no such program at the University of the Aegean, many non-academic staff have expressed intentions to engage in environmentally friendly

work and lifestyle practices if (a) they have access to more data/information and knowledge that have to do with environmental issues and (b) there are clear university policies to promote sustainability on campus. Additionally, they are willing to work together with their colleagues and the rest of the university community when dealing with environmental protection actions. The University of the Aegean non-academic staff feel that they cannot be involved in sustainability programmes if they are not adequately educated/trained.

In sum, we came to the conclusion that the environmental intentions of the universities seem to be promising. Nevertheless, the application of a SD policy is still far from realised.

Table 4- Results from Greece

Item	University of Crete (founded 1973, 15.000 students)	University of Macedonia (founded 1957, 15.300 students)	Aristotle University of Thessaloniki (founded 1925, 81.500 students)	National Technical University of Athens (founded 1836, 10.000 students)	University of the Aegean (founded 1984, 12.000 students)
SD policy	**-**	**X**	**-**	**-**	**-**
Green campus procedures	X	X	X	-	X
SD in the curriculum	X	X	X	X	X
SD and Networking	X	X	-	-	X
SD and Training	-	X	-	-	-
SD and Outreach	X	X	X	-	X
SD and Procurement	-	X	-	-	-
SD and students´engagement	X	X	-	-	X
Joint local/regional SD activities	X	X	X	-	X
International networking on SD	X	X	X	-	X

Country 4: Portugal

In Portugal, discussion around the role of universities in relation to SD has been incipient, studies are recent (e.g., Aleixo et al., 2016, 2017a, b), and the few events which have been organised have been limited to an environmental perspective. This lack of engagement is illustrated by a situation whereby before 2005 just one institution (the University Nova of Lisboa) had signed up to the Talloires Declaration. Universities signing the Copernicus Charter in 1994 were limited to Universidade Nova de Lisboa (UNL); Universidade de Lisboa (UL); Universidade Técnica de Lisboa (UTL); Universidade do Porto (UP); Universidade do Minho (UM) and Universidade Católica Portuguesa (UCP). Since then, although some Portuguese universities have been developing sustainability initiatives (e.g. University of Algarve, Aveiro, Porto, Nova of Lisboa, Técnica of Lisboa), there is a gap in terms of coordination and communication at the national level, which could have detrimental consequences (Couto et al., 2005).

Nevertheless, some Portuguese institutions have formal SD policies Aleixo et al., 2016, 2017a, b) as is also the case of the five universities enrolled in this study. This information is explicit in the university webpages and available documentation (see Aleixo et al., 2016, 2017b). However, green campus procedures (e.g. energy saving programmes, waste prevention and/or management schemes, environmentally friendly dormitories, etc.) are just assigned to two universities (Minho and Coimbra). Our perception is that there are more institutions implementing green practices on their campus, at least in terms of energy and water saving, but these are not formally stated. The recent study from Aleixo et al. (2017a) confirms that this perception seems to be correct. Regarding SD in the curriculum (BSc, MSc or PhD courses), only two universities (Aveiro and Minho) incorporate this theme in their courses. These institutions are relatively "young", and open to new trends, as is the case for SD in Portugal (Aleixo et al., 2016, 2017b).

Surprisingly there are four items in which none of the universities participate. For instance, in SD and Networking the sampled universities have not developed a systematically established SD network to link up staff. Similarly, in the case of SD and Training, the universities have yet to introduce procedures for the training of staff on matters related to SD (e.g. formal series of seminars, guest lectures, courses, etc.). In SD and Procurement, we found that the sampled universities lack official procedures for SD considerations in purchases, awards of contracts, catering and other service areas. Instead, the *environmental* performance of suppliers was the main criterion used. Regarding SD and students' engagement, we found that no sampled universities have official procedures for this area. Again our perception in that some specific activities do exist but that there is no official information or policy. However some recent studies have shown indications of how this could happen (e.g. Aleixo et al., 2017a; Disterheft et al., 2015 a,b) and again the recent study from Aleixo et al. (2017a) confirms that this perception seems to be correct.

Four of the sampled universities have procedures for Outreach on SD (e.g. public events, open seminars, conferences, etc.). This was observed in various research units' scope, mission and activities.

Finally, we found that all sampled universities have official procedures for joint SD activities with local actors (e.g. NGOs, municipality, regional government, etc.). This was also the case for the existence of official procedures for International networking on SD. We found that all had signed at least one (Copernicus) international declaration.

Table 5. Results from Portugal

Item	Aveiro University (founded 1973, 12.584 students)	Minho University (founded 1973, 18.330 students)	Coimbra University (founded 1290, 9.589 students)	Porto University (founded 1911, 31.352 students)	Lisbon University (founded 2013, 48.147 students)
SD policy	X	X	X	X	X
Green campus procedures	X	X	X	-	-
SD in the curriculum	X	X	-	-	-
SD and Networking	-	-	-	-	-
SD and Training	-	-	-	-	-
SD and Outreach	X	X	X	X	-
SD and Procurement	-	-	-	-	-
SD and students' engagement	-	-	-	-	-
Joint local/regional SD activities	X	X	X	X	X
International networking on SD	X	X	X	X	X

Country 5: South Africa

The sampled universities from South Africa have been chosen within the context of geographical realities, as well as the socio-cultural and political dynamics currently characterising the higher education landscape in the country. Included in the sample is the University of Stellenbosch (one of the southernmost universities), University of Pretoria (one of the northernmost universities and situated in an urban context), University of South Africa (an open and distance learning university with countrywide reach and accessibility to the whole population), Rhodes University (the smallest traditional university and located to the east) and lastly North-West University (a contact and distance learning university, located to the west). Data gathering followed a combination of methods, relying on research through institutional websites, analysis of documents (mainly policies) and interviews and question/answer methodologies.

Immediately evident is a lack of dedicated SD policies in the majority of sampled South African universities. This being the case, it has to be pointed out that virtually all of these universities have environmental sustainability or sustainable environmental management policies or procedures in place (i.e. the *Integrated Sustainability Management Policy* of the University of Stellenbosch) or are in the process of putting these in place (as with North-West University). Interestingly, the smallest traditional university in South Africa, Rhodes University, is the only university with a long-standing environmental sustainability policy. In association, a variety of green campus procedures and initiatives were commonly observed across all these universities. These are a well-implemented aspect that institutions are proud of and therefore inclined to showcase. Together with

this, the majority of these universities seem to have networks within the institutions linking up staff in terms of sustainability. Yet these are mostly focused on environmental sustainability (i.e. the *Living Green Initiative* of the University of South Africa) and not necessarily incorporating other dimensions of sustainability. SD involvement through joint local/regional activities and community engagement projects seem to be common practice at many of these universities. A positive development is that the inclusion of SD in the curriculum is covered quite well by all of these universities, although rather the result of bottom-up approaches than associated with policy imperatives.

It has to be emphasised that although the majority of sampled South African universities do not meet some of the SD criteria in the matrix, this does not imply that there is no activity at all regarding that criteria. This is simply an indication that evidence related to compliance is too "thin" to be able to regard these criteria as being complied with. SD and outreach in terms of public events, open seminars and similar events, as well as SD and staff training, stand out as areas where these universities are least likely to have procedures or policies in place. Procedures and policies for SD and procurement, as well as SD and student engagement can still receive more attention at some universities. One of the universities, Rhodes University, stands out with compliance in terms of all items, whereas the other universities fall short in terms of compliance, with varying degrees of participation. Regarding international networking, these universities are doing well. Two are signatories to SD related agreements such as the United Nations Global Compact and the Talloires Declaration, one has membership with the Association for the Advancement of Sustainability in Higher Education, and one is part of the Talloires Network.

Table 6. Results from South Africa

Item	University of Stellenbosch US (founded 1918, 27.694 students)	North-West University NWU (founded 2004, 47.144 students)	University of South Africa Unisa (founded 1873, 336.286 students)	Rhodes University RU (founded 1904, 5.372 students)	University of Pretoria UP (founded 1908, 62.000 students)
SD policy	-	-	-	X	-
Green campus procedures	X	X	X	X	X
SD in the curriculum	X	X	X	X	X
SD and Networking	X	X	X	X	-
SD and Training	-	X	-	X	-
SD and Outreach	-	X	-	X	-
SD and Procurement	X	-	-	X	-
SD and students' engagement	X	X	-	X	-

Joint local/regional SD activities	-	X	X	X	X
International networking on SD	X	X	X	X	-

Country 6: United Kingdom

The UK sample was selected on the basis of geographical location (two institutions in England (one North and one South), one institution in Scotland, one in Ireland and one in Wales. It includes: Manchester Metropolitan University; University of Wales Trinity Saint David; Queen's University Belfast, Edinburgh Napier University, Bournemouth University.

In the UK, most institutions are members of the Environmental Association of Universities and Colleges (EAUC); a national organisation that has been a force for change in relation to SD and whose members are largely environmental managers within universities. Most have engaged extensively with carbon reduction approaches and environmental management as a result. Yet this is also because these have been prioritised in the national policy context. As a consequence "Environmental Management" strategies and policies for campus greening are common place. Green campus procedures are extensive, although within these there may be some variation as to issues addressed (e.g. some institutions will cover biodiversity extensively while others may have focused on renewable energy or green buildings). Strategies that specifically articulate SD (compared to environmental management) may be less common within the UK (with the exception that in Wales, SD and Global Citizenship are compulsory for Further and Higher Education). However, each of the institutions sampled had formal policies that specifically referred to SD. This said, it is worth noting that institutions in the UK undoubtedly have a stronger focus on environmental sustainability whilst social sustainability is often underdeveloped.

Engaging students in SD is increasingly common with a number of UK universities leading on extra-curricular approaches to ESD that are student-led. The National Union of Students (NUS) has played a driving role through initiatives such as " Green Impact". Training in relation to environmental issues has been fairly robust. The development of academic staff in relation to ESD is increasing in UK institutions but the impact of the offer is still undefined. UK universities all have formal strategies for engaging their community stakeholders. Yet these may not always include specific reference to SD, or be driven by ambitions to develop SD in the local community. All universities will be likely to be engaging in international networking on SD but they will not necessarily have endorsed formal declarations such as Copernicus at the institutional level. Indeed many of the leaders of SD in the UK appear to have taken on such roles without the need for signatories to International Declarations.

Table 7. Results from the United Kingdom

Item	Manchester Metropolitan University (founded 1970, 27.265 students)	University of Wales Trinity Saint David (founded 2010, 10.425 students)	Queen's University Belfast (founded 1845, 24.560 students)	Edinburgh Napier University (founded 1965, 15.691 students)	Bournemouth University (founded 1992, 16.868 students)
SD policy	X	X	X	X	X
Green campus procedures	X	X	X	X	X
SD in the curriculum	X	X	-	-	X
SD and Networking	X	-	-	-	X
SD and Training	X	X	-	-	X
SD and Outreach	X		-	-	X
SD and Procurement	X	X	-	X	X
SD and students' engagement	X	X	-	X	X
Joint local/regional SD activities	-	-	-	X	X
International networking on SD	X	-	X	-	-

Country 7: United States

Each of the five universities, as seen in Table 8, has formal SD policies. The most explicit are "Climate Action Plans (CAPs)". Observed in four universities, these articulate multi-decade commitments and strategies to reduce building and travel-related energy consumption and GHG emissions (typically to zero and carbon neutrality), and also list GHG emissions inventories. Target years to attain climate neutrality vary widely, ranging from 2030 (CU) to 2050 (CSU and WSU). The prevalence of CAPs and formal sustainability policies in USA universities, and relatively high levels of sustainability engagement, is likely explained by several factors. These include desires to reduce energy expenditures and respond to student demands for increased campus sustainability.

Four of five universities have procedures for advancing sustainability related-courses in the curriculum. Again, both the Talloires Declaration and the CUPCC call for this. Examples of initiatives at the institution-level include: i) explicit commitments to ensure all students graduate with sustainability literacy and surveys to measure literacy and sustainable behaviours among the student body (CSU, EU and UM), and ii) a campus-wide and annual "teach-in" on climate change (CU) where faculty are encouraged to cancel classes to facilitate campus-wide attendance for a full-day and incorporation of sustainability and climate change into courses. These institution-wide initiatives also function as mechanisms for formally linking staff and faculty around sustainability issues. At UM, sustainability education is fostered through university-level monitoring of curricula throughout its separate academic departments.

Overall, formal procedures for staff training are limited to two institutions. UM has established a formalized web-based, voluntary self-training program targeting staff, faculty and students. CSU offers once-per year seminars and training sessions related to sustainability through a Professional Development Institute. Next, although universities engage actively in various international sustainability research projects, formal and university-level procedures were limited to membership to the International Sustainable Campus Network (CU) and the Talloires Declaration (CU and CSU).

The USA sample performs strongly in green procurement. Four universities possess formal policies. These typically cover electronics, paper, cleaning and student dining. Additionally, U.S. universities generally compete intensely to attract students with sustainable dining options. Various formal procedures include the procurement of organic, seasonal or locally-sourced produce, composting and zero-waste initiatives.

Student engagement policies were also widespread. Since most USA undergraduate students live in on-campus residence halls during at least one year, such settings are actively used to foster sustainability awareness and promote student engagement around sustainability activities. Common trends include use of “eco-leaders” and competitions between residence halls to spur student engagement to energy conservation, recycling and composting. Other measures include the integration of students into official sustainability committees. As other examples, CU mobilizes its entire student body around climate change for a full day teach-in through key note and faculty lectures, films and events. With a similar objective, UM annually holds outdoor EarthFest to expose students to various aspects of sustainability. Other universities too used open public lectures and community or region-wide symposiums with other universities and societal sectors as formal community outreach mechanisms.

Lastly, procedures were observed for formally engaging in joint sustainability activities with local stakeholders. Specific mechanisms include research or community engagement institutes with a specific mission to engage with local community and regional stakeholders to advance sustainability or green development.

The USA sample of universities is actively engaged in pursuing sustainability through multiple functions—in both a centralised and decentralised manner. That said, the predominantly environmental focus (particularly energy consumption and GHG emissions) of CAPs often fail to provide institutional-level guidance and targets for pursuing sustainability from a wider social and environmental perspective.

Table 8. Results from the United States

Item	Colorado State University (CSU) (founded 1870, 32.236 students)	University of Michigan (UM) (founded 1817, 43.651 students)	Elon University (EU) (founded 1889, 6.631 students)	Weber State University (WSU) (founded 1889, 24.048 students)	Clark University (CU) (founded 1887, 3.178 students)
SD policy	X	X	X	X	X
Green campus procedures	X	X	X	X	X
SD in the curriculum	X	X	X	-	X
SD and Networking	X	X	X	-	X
SD and Training	X	X	-	-	
SD and Outreach	X	X	X	X	X
SD and Procurement	X	X	X	-	X
SD and students' engagement	X	X	X	X	X
Joint local/regional SD activities	X	X	X	-	X
International networking on SD	-	X	X	-	X

All Countries

Given the results presented above, is now time to establish a comparison between all countries regarding the main findings. Thus, table 9 provides an overall view of the collated results achieved by this research, focusing in the difference of the results between the unversities with SD policy (57%) and the others without formal SD policy (43%). In Portugal, UK and USA, all the sampled universities were found to have a SD policy. In Greece and South Africa, only one university with a SD policy was observed in each country. This said, most sampled universities in Greece and South Africa have green campus procedures (four in Greece, five in South Africa). All sampled universities evidenced an involvement in environmental sustainability policies or procedures.

In addition, all sampled universities in Brazil, Greece and South Africa have procedures for the integration of SD issues in the curriculum. The sampled universities in Greece revealed that one university is involved in SD and networking, and that one further university is involved in SD and training.

In Greece, Portugal and the USA, most universities sampled have procedures for SD and outreach. In Germany and Greece, only one sampled university in each country has official procedures for SD considerations in procurement purchases.

All universities sampled in the US have official procedures for student engagement on matters related to SD.

Most sampled universities have joint local/regional SD activities (four in each country with the exception of two in the UK). Formal policies and procedures for international networking on SD is also a significant trend, with four in each country, with the exception of Brazil (none), UK (two) and US (two).

Overall, universities in the USA sample outperformed other countries regarding most dimensions of the matrix. Yet as mentioned, this was not the case for policies and procedures in SD training and International Networking on SD. Both UK and South Africa showed solid involvement in meeting the dimensions of participation in SD, followed by Germany, Greece Brazil and Portugal.

Table 9. Summary of the Results used in the statistical analysis

Country	University ID	**SD policy**	Green campus procedures	SD in the curriculum	SD and Networking	SD and Training	SD and Outreach	SD and Procurement	SD and students´ engagement	Joint local/regional SD activities	International networking on SD
		Var01	Var02	Var03	Var04	Var05	Var06	Var07	Var08	Var09	Var10
Germany	1		X		X	X	X	X		X	X
	2	X	X	X	X	X	X		X	X	X
	3	X	X	X	X				X	X	X
	4		X		X		X			X	X
	5				X					X	X
Brazil	6	X	X	X		X		X		X	
	7	X	X	X		X		X			
	8			X			X	X		X	
	9		X	X	X	X	X	X	X	X	
	10		X	X	X	X				X	
Greece	11		X	X	X		X		X	X	X
	12	X	X	X	X	X	X	X	X	X	X
	13		X	X			X			X	X
	14			X							
	15		X	X	X		X		X	X	X
Portugal	16	X	X	X			X			X	X
	17	X	X	X			X			X	X
	18	X	X				X			X	X
	19	X					X			X	X
	20	X								X	X
South Africa	21		X	X	X			X	X		X
	22		X	X	X	X	X		X	X	X
	23		X	X	X					X	X
	24	X	X	X	X	X	X	X	X	X	X
	25		X	X						X	
United Kingdom	26	X	X	X	X	X	X	X	X		X
	27	X	X	X		X		X	X		

	28	X	X							X
	29	X	X					X	X	X	
	30	X	X	X	X	X	X	X	X	X	
United States	31	X	X	X	X	X	X	X	X	X	
	32	X	X	X	X	X	X	X	X	X	X
	33	X	X	X	X		X	X	X	X	X
	34	X	X				X		X		
	35	X	X	X	X		X	X	X	X	X

Table 10 shows the results of the Chi-square test of adhesion. A statistical analysis confirms the weak relationship observed between the SD policy and the other sustainability efforts in the universities. Only the variables 2, 3 and 9 presented significant differences ($p<0.05$), meaning that, the existence of initiatives as green campus procedures, SD in the curriculum and joint local/regional SD activities, have significative relation with the existence of SD policy. Thus, it seems that SD policies cannot be strictly regarded as preconditions for universities to engage on sustainability issues. In other hand, universities with SD policy are more likely to invest in initiatives as green campus, integration of SD in curriculum and have official procedures for joint SD activities with local actors.

Table 10. Results of Statistical analysis

	Var01	Var02	Var03	Var04	Var05	Var06	Var07	Var08	Var09	Var10
Chi-square	1,400[a]	17,857[a]	8,257[a]	0,714[a]	1,400[a]	2,314[a]	0,257[a]	0,029[a]	12,600[a]	3,457[a]
gl	1	1	1	1	1	1	1	1	1	1
p-value	0,237	0,000	0,004	0,398	0,237	0,128	0,612	0,866	0,000	0,063

Although twenty of the thirty-five sampled universities had an official policy or procedure that specifically addressed SD, this is not an indicator that the remainder are not engaged with substantial actions in this area. Indeed, all of the universities in the sample, regardless of the existence of a formal policy, demonstrated engagement with environmental sustainability policies or procedures in some form or another. This suggests that universities are mostly focused on their performance as seen in the concerted visible and tangible efforts that are in place to create awareness and involvement, rather than solely focussing on policy that is not fully realised in the sampled universities. The latter indicates a typical bottom-up approach suggested in other studies (e.g. Disterheft et al., 2012). Also related to the latter is the inclusion of SD in the curriculum in all countries, even though their respective sampled universities may have lacked formal SD policies.

Clark and Kouri (2009) compare six frameworks for environment management in IES and show tha the policy is the first step of all. Overall, the sampled universities are actively engaged in green campus procedures and striving for sustainability. An explication these results is that they may be reflecting isolated actions at universities without SD policy (Brandli et al,2011). Clearly, small scale

decentralised endeavours on campus, together with local/regional SD activities, produce more useful and mutually beneficial results than centralised sustainability efforts related to international networking on SD. As was also observed, some countries evidenced an advance regarding SD implementation in HEIs in comparison with the others and we can infer that there are many cases where aspects of sustainability policies are present, but not as a formal policy or procedure.

7. Conclusions

It is clear that in all five countries, all sampled universities showed evidence of being involved in sustainability policies or procedures. It is an indicator of how these universities have deemed it important to committing themselves to developing their environmental programmes, research and community outreach, as well as addressing their general environmental management practices. The paper has revealed that the existence of SD policies is not a precondition for universities to engage in SD. However, the statistical analysis showed that universities with SD policies have more probability to have initiatives as green campus procedures, SD in the curriculum and joint local/regional SD activities, when compared with those who do not.

The existence of a SD policy in given universities often—but not always—means that other areas (e.g. SD training) are equally developed. This illustrates the fact that SD policies are valuable tools in showing the commitment of HEIs to sustainability, and assist in the implementation of sustainability training efforts. The absence of a SD policy at a given university does not necessarily mean that it would perform poorly in dealing with environmental or social issues. As our findings have shown, even in universities with no formal SD policies, there can be successful sustainability initiatives.

The greatest weaknesses are seen in respect to SD and procurement. Only a few universities were observed to be active in this respect. This trend shows that much attention is needed here. This research has been limited by the fact that it is based on the information made publicly available or provided by the sampled universities. Despite this, it is one of the largest research efforts of this kind ever performed. It provides some valuable insights into the connections between SD policies on the one hand, and the practice of SD in HEIs on the other. Other explanations and variables which may influence SD policies, that were not the focus of this paper, should be considered and developed in future research. In addititon, research of this type needs to be developed alongisde research on the enactment of SD policies.

References

Aleixo, A.M., Leal, S. and Azeiteiro, U.M. (2017a), "Conceptualizations of sustainability in Portuguese higher education: roles, barriers and challenges toward sustainability". *Journal of Cleaner Production* (in press) http://dx.doi.org/10.1016/j.jclepro.2016.11.010

Aleixo, A.M., Azeiteiro, U.M. and Leal, S. (2017b), "UN Decade of Education for Sustainable Development: Perceptions of Higher Education Institution's Stakeholders in Leal Filho, W.,

Azeiteiro, U.M., Alves, F. and Molthan-Hill, P., (Eds.) 2016. "*Handbook of Theory and Practice of Sustainable Development in Higher Education*", Springer, pp 417-428.

Aleixo, A.M., Azeiteiro, U.M. and Leal, S. (2016), "Toward Sustainability through Higher Education: Sustainable Development incorporation into Portuguese Higher Education Institutions", in Davim, J.P. and Leal Filho, W. (Eds), *Challenges in Higher Education for Sustainability,* Springer, pp: 159-187.

Amaral, L.P., Martins, N. and Gouveia, J.B. (2015), "Quest for a sustainable university: a review." *International Journal of Sustainability in Higher Education*, Vol. 16 No.2, pp. 155 – 172.

Baumal, W.J. and Oates W.E. (1988), "The theory of environmental Policy". Cambridge University Press. United Kingdon, 299p.

Bellou, C., Petreniti, V. and Skanavis, C. (2017), "Greening the Campus Intensions: A study of the University of the Aegean non academic staff's environmental profile" *International Journal of Sustainability in Higher Education,* Vol 18, No 14, (In Press)

Beynaghi, A., Moztarzadeh, F., Maknoon, R., Waas, T., Mozafari, M., Huge, J. and LealFilho, W. (2014), "Towards an orientation of higher education in the post Rio +20 process: How is the game changing?" *Futures* Vol 63, pp 49-67.

Brandli, L.L, Frandoloso M.A.L and Tauchen, J. (2011) Improving the environmental work at University of Passo Fundo, Brazil—towards an environmental management system. *Brazilian J Oper Prod Manage* Vol 8, No 1, pp 31–54

Brandli, L.L., Leal Filho, W., Frandoloso M.A.L., Korf, E.P. and Daris, D. (2015), "The Environmental Sustainability of Brazilian Universities: Barriers and Pre-conditions " in W. Leal Filho, U. Azeiterio, S. Caeiro and F. Alves. (Eds.), *Integrating Sustainabilitity Thinking in Science and Engineering Curricula*. Springer, pp. 63-74.

Carpenter, D. and Meehan B. (2002), "Mainstreaming environmental management: sase studies from Australasian universities". *International Journal of Sustainability in Higher Education*. Vol3 No 1, 19-37.

Ciferri, L. and Lombardi, P. (2009), " The role of university education in fostering sustainable and responsible development." *Working paper presented in 2009 G8 University Summit*. Torino, Italy, May 17th-19th.

Clark, A. and Kouri, R. (2009) Choosing an appropriate university or college environmental management system. *Journal of Cleaner Production*, Vol 17, pp 971–984

Collier, D. (1993), The comparative method. In Finifter, A.W., (ed), Political Science: The state of the discipline II. Washington, DC: American Political Science Association, pp 105-119.

Couto, A.P., Alves, M.C., Matos, A.F. and Carvalho, P.G. (2005), "Universidade na transição para a sustentabilidade: tendências, estratégias e práticas", in N. Bryan, L. Gonçalves and O. Sanchez (Eds), Los Desafios de la Gestión Universitária hacia el Desarrollo Sostenible, UNA/UNICAMP, Costa Rica, pp. 25-48.

De La Harpe, B. and Thomas, I. (2009), "Curriculum Change in Universities Conditions that Facilitate Education for Sustainable Development". Journal of Education for Sustainable Development, Vol 3, No 1, pp 75–85.

Disterheft, A., Caeiro, S., Leal Filho, W. and Azeiteiro, U.M. (2016), "The INDICARE-model: measuring and caring about participation in higher education? sustainability assessment" *Ecological Indicators.* Vol 63. pp 172-186.

Disterheft, A., Azeiteiro, U. M., Leal Filho, W. and Caeiro, S., (2015a), "Participatory processes in sustainable universities – what to assess?" *International Journal of Sustainability in Higher Education*. Vol 16 No 5, pp 748 – 771.

Disterheft, A., Caeiro, S., Azeiteiro, U. M. and Leal Filho, W. (2015b), "Sustainable universities - A study of critical success factors for participatory approaches" *Journal of Cleaner Production*. Vol 106, pp 11-21.

Disterheft, A., Caeiro, S., Ramos, R. and Azeiteiro, U.M., (2012), " Environmental Management Systems (EMS) implementation processes and practices in European Higher Education Institutions ? top-down versus participatory approaches" *Journal of Cleaner Production*. Vol31, pp 80- 90.

EAUC (2015), "Sustainability in Higher Education. Survey research by the Environmental Association of Universities and Colleges, National Union of Students, University and College Union, Association of Colleges and the College Development Network", available at: http://www.eauc.org.uk/home (accessed 21 october, 2015).

Evangelinos, K., Jones, N. and Panoriou, M.E. (2009), "Challenges and opportunities for sustainability in regional universities: a case study in Mytilene, Greece". *Journal of Cleaner Production*, Vol 17 pp 1154–1161

Ferrer-Balas, D., Lozano, R., Huisingh, D., Buckland, H., Ysern, P. and Zilahy, G. (2010), "Going beyond the rhetoric: system-wide changes in universities for sustainable societies", *Journal of Cleaner Production*, Vol 18, pp607–610

Goodnough, T., Kildegaard, A., Kuchenreuther, M., Rasmussen, L. and Wyckoff, (2009), "Leveraging assets: a case study of the sustainability initiative at the University of Minnesota, Morris". *Journal of Cleaner Production, Vol17, pp1138–1142*

Hák, T., Janoušková, S. and Moldan, B. (2016), "Sustainable Development Goals: A need for relevant indicators". *Ecological Indicators*, Vol 60, pp. 565–573.

Hansen, J.A. and Lehman, M., (2006), "Agents of change: universities as development hubs". *Journal of Cleaner Production*, Vol14, No 9–11, pp 820–9.

HEFCE (2013), "Sustainable development in higher education Consultation on a framework for HEFCE". Policy development Consultation, November 2013/31

Jordan, A., Wurzel, R.K.W. and Zito, A. (2005), "The rise of 'new' policy instruments in comparative perspective: Has governance eclipsed government?" *Political Studies*, Vol53, No 3, pp 477-496.

Landman, T. (2008), "Issues and methods in comparative politics: An introduction." 3rd ed. London, New York: Routledge, 292p.

Leal Filho, W. (2015). (Hrsg.), Forschung für Nachhaltigkeit an deutschen Hochschulen. Springer, Berlin.

Leal Filho, W., Manolas, E., Pace, P. (2015a), "The future we want". *International Journal of Sustainability in Higher Education*, Vol16, No1, pp. 112 - 129.

Leal Filho, W., Shiel, C. and Paço, A. (2015b) "Integrative approaches to environmental sustainability at universities: an overview of challenges and priorities." *Journal of Integrative Environmental Sciences,* Vol 12, No 1, pp 1-14.

Leal Filho, W. (2012), "Sustainable Development at Universities: New Horizons". Peter Lang Scientific Publishers, Frankfurt.

Leal Filho, W. (Hrsg.) (1998), "Umweltschutz und Nachhaltigkeit an deutschen Hochschulen". Peter Lang Scientific Publishers, Frankfurt, 198p

Leal Filho, W., MacDermott, F. and Padgham, J. (Eds) (1996), Implementing Sustainable Development at University Level: A Manual of Good Practice.CRE, Geneva.

Lidgren A,, Rodhe H. and Huisingh D. (2006), "A systemic approach to incorporate sustainability into university courses and curricula" *Journal of Cleaner Production*, Vol14, No 9–11, pp797–809

Lor, P. (2011), "Methodology in comparative studies." *International and comparative librarianship – A thematic approach*. available at: https://pjlor.files.wordpress.com/2010/06/chapter-4-draft-2011-04-20.pdf (Accessed 25 November 2015)

Lozano, R., Lozano, F.,J., Mulder, K., Huisingh, D., Waas, T., (2013), "Advancing higher education for sustainable development: international insights and critical reflections". *Journal of Cleaner production*. Vol 48, pp3-9.

Lozano R. (2011), "State of Sustainability Reporting in Universities", International Journal of Sustainability in Higher Education, 12, pp.67-78. doi: 10.1108/14676371111098311

Lozano, R., (2006), "A tool for a Graphical Assessment of Sustainability in Universities (GASU)", *Journal of Cleaner Production.* Vol14, pp 963-972

Madeira, A.C., Carravilla, M.A., Oliveira, J.F. and Costa, C.A.V. (2011), "A methodology for sustainability evaluation and reporting in higher education institutions". *Higher Education Policy*, Vol 24, 459-479.

Mader, C., Scott, G. and Razak, D. A. (2013), "Effective change management, governance and policy for sustainability transformation in higher education". *Sustainability Accounting, Management and Policy Journal*, Vol. 4 No3 pp. 264–284.

Mogesen, F. and Mayer, M. (2005), "Eco Schools, trends and divergences: A Comparative Study on Eco- School Development Processes in 13 countries". Publisher: Austrian Federal Ministry of Education, Science and Culture. Austria, p. 362

Palma, L.C., de Oliveira, A.M. and Viacava, K.R. (2011), "Sustainability in Brazilian federal universities". *International Journal of Sustainability in Higher Education*, Vol 12, No 3, pp. 250-258.

Radford, A. (2012), "A critical assessment of university sustainable development policy: a Gloucestershire case study". *Earth & Environment,* Vol 8, pp 210-241.

Sammalisto, K., Sundstrom, A. and Holm, T. (2014), "Implementation of sustainability in universities as perceived by faculty and staff - a model from a Swedish university". *Journal of Cleaner Production* Vol 106, pp45–54.

Shiel, C. and Jones, D. (2016), "Sustainability and Social Justice: Leadership Challenges" in Shultz, L. and Viczko, M. (Eds.) *Assembling and Governing the Higher Education Institution: Democracy, Social Justice and Leadership in Global Higher Education.* Palgrave Studies in Global Citizenship Education and Democracy Series, pp 11-34.

Shiel, C., Leal Filho, W., Paço, A. and Brandli, L. (2016), "Evaluating the engagement of universities in capacity building for sustainable development in local communities". *Evaluation and Program Planning*, Vol54, pp123-134.

Shiel, C. and Williams, A. (2015), "Working together, driven apart: Reflecting on a joint endeavour to address sustainable development within a university. In W. Leal Filho, L. Brandli, O. Kuznetsova and A. Paço . (Eds.), *Integrative approaches to sustainable development at university level*. Springer, pp. 425–447

Siegel, A. (2016), "Chi-Square Analysis: Testing for Patterns in Qualitative Data. Pratical Business Statistics", 17th edition. Elsevier. pp 509-524.

St Andew's University (2012), "Sustainable Development Policy and Strategy 2012 to 2022", available in https://www.st-andrews.ac.uk/environment/importantinfo/sustainabledevelopmentpolicies/ (Accessed 04 March 2017)

Steiner, L., Sundstrom, A. and Sammalisto, K. (2013), "An analytical model for university identity and reputation strategy work". *Higher Education,* Vol 65, No 4, ´pp 401-415.

Sterling, S., Maxey, L. and Luna, H. (Eds.) (2013), "The sustainable university: Progress and prospects". London: Earthscan/Routledge.

Tilbury, D. (2013), "Another world is desirable: A global rebooting of higher education for sustainable development", in S. Sterling, L. Maxey, & H. Luna (Eds.), *The sustainable university: Progress and prospects*, London: Earthscan/Routledge, pp. 71–86.

Too, L. and Bajracharya, B., (2015), "Sustainable campus: engaging the community in sustainability". *International Journal of Sustainability in Higher Education*, Vol. 16 No 1 pp. 57–71.

Trencher, G., Rosenberg D., McCormick, K., Terada, T., Petersen, P., Yarime, M. and Kiss, B. (2016), " The role of students in the co-creation of knowledge and societal transformations towards sustainability: Experiences from Lund, Tokyo and Ohio" in Leal Filho, W. and Brandli, L.L. (Eds) Engaging Stakeholders in Education for Sustainable Development at the University Level. Springer: Berlin, pp. 191-215.

Trencher, G., Yarime, M., McCormick, K., Doll, C. and Kraines, S. (2014), "Beyond the third mission: Exploring the emerging university function of co-creation for sustainability". *Science and Public Policy*. Vol 41, No 2, pp 151-179.

University of British Columbia (2015), Avaliable in:https://sustain.ubc.ca/ (accessed: 27 November 2015).

Velazquez L., Mungula N., Plat A. and Taddel J. (2006), "Sustainability university: what can be the matter?" *Journal of Cleaner Production*, Vol 14, No 9–11, pp 810–9.

Venzke, C.S., Nascimento, L.F.M., Gomes, L.P. and Campani, D.B. (2012), "Environmental Management on University Campuses in Southern Brazil" in: Walter Leal Filho (ed)

Sustainable Development at Universities: New Horizons 73. Frankfurt am Main: Peter Lang Scientific Publishers, vol 34, pp 885–898

Wals, A.E.J. and Blewitt, J. (2010),"Third wave sustainability in higher education: some (inter)national trends and developments" in J. Paula, S. David, and S. Sterling (Eds.), Sustainability education: perspectives and practice across higher education. Abingdon (UK): Earthscan. pp. 55-74.

Yale University (2015), "Sustainability Strategic Plan (2013-2016)", Yale Office of Sustainability, New Haven, CT.

Zachariou, A., Kaila, M. and Katsikis, A. (2008), Sustainable School: Facts, Objectives and Prospects, *Science and Technology Topics in Education*,Vol 1, No 3, pp 269-288.

Zilahy, G. and Huisingh, D. (2009), "The roles of academia in Regional Sustainability Initiatives". Jornal of Cleaner Production. Vol 17, pp 1057–1066.

Bio-notes

Walter Leal Filho is a Senior Professor and Head of the Research and Transfer Centre "Applications of Life Sciences" at Hamburg University of Applied Sciences in Germany, and Chair of Environment and Technology at Manchester Metropolitan University, UK. He is the initiator of the Word Sustainable Development Symposia (WSSD-U) series, and chairs the Inter-University Sustainable Development Research Programme. Professor Leal Filho has written, co-written, edited or co-edited more than 300 publications, including books, book chapters and papers in refereed journals.

Luciana Brandli is an Associate Professor in the University of Passo Fundo, Brazil, working in the Ph.D Program in Engineering, Infrastructure and Environment. Her current research interests include sustainability in higher education and green campus, environment management, management of urban infrastructure, sustainable cities and green buildings. She supervises a number of Masters and doctoral students on engineering, environment and sustainability issues, and has in excess of 150 publications.

Deisi Becker is a professor on Strategic Management and Innovation, Technology and Sustainability. Member of the Sustainability Research Group - Federal University of Rio Grande do Sul - Brazil. Member of the Management Research Group - Unifra -Rio Grande do Sul, Brazil. PhD student on Activity Theory - Federal University of Rio Grande do Sul - Brazil and Hamburg University of Applied Sciences/Germany.

Constantina Skanavis is a Professor in Environmental Communication and Education at the Department of Environment, University of the Aegean (Mytilene, Greece). She is also the Head of the Research Centre of Environmental Education and Communication. She joined the University of the Aegean 15 years ago. Before that she was a Professor at California State University, Los Angeles. She has developed several courses on issues of environmental health and education. She currently teaches environmental education, environmental communication and environmental interpretation courses in undergraduate and postgraduate levels. Professor Skanavis has numerous publications on a international basis and has given presentations all over the world.

Aristea Kounani is a PhD Candidate of the Department of the Environment of the University of the Aegean and a senior researcher on the Research Unit of Environmental Education and Communication, of the Department of Environment. She has a Master Degree on "Agriculture and Environment", and a Bachelor Degree on the Agricultural Technology. Aristea's researches are in the area of climate change, sustainable development, environmental education and communication. She is currently conducting researches on the issue of refugees (environmental-climate refugees), Education for Sustainable Development and Climate Change Communication.

Chrysoula Sardi is a postgraduate student in Science and Technology of Water Resourses – Port Management at the Department of Civil Engineers, National Technical University of Athens. She has

B. Sc. in Environmental Science and she is also a member of the Research Centre of Environmental Education and Communication, University of the Aegean. Her first diploma was in Architectural Technology from the University of Wales.

Dimitra Papaioannidou Graduate student of University of the Agean, Department of Environmental Science. Price winner for her thesis "How Green are the Greek Universities" of the University of the Agean and Ecopolis Awards 2016.

Arminda Paco is a researcher of NECE research centre and an assistant professor at University of Beira Interior in Portugal. Her research interests are mainly directed toward the sustainability and environmental marketing, as well as the entrepreneurship education.

Ulisses M Azeiteiro is a Senior Professor (Associate Professor with Habilitation and Tenure), Coordinator of the Climate Change and Biodiversity Assets Unit from the Biology Department and Integrated Member/Senior Researcher of the Centre for Environmental and Marine Studies (CESAM) at University of Aveiro in Portugal. His main interests are the Impacts of Climate Change in the Marine Environment (Biology and Ecology of Global Change) and Adaptation to Climate Change in the Context of Sustainable Development (Social and Environmental Sustainability and Climate Change). Research Coordinator since 2008 he was a member of several evaluation panels from research projects and grants (International, European and National—Portuguese and outside Portugal), member of the organizing and scientific committees of more than 100 international and national congresses, member of more than 150 exam panels for viva voice examinations (for Ph.D and MSc) and career assessment and supervised over 50 postgraduate students (MSc and Ph.D students). Professor Ulisses M Azeiteiro has written, co-written, edited or co-edited more than 200 publications, including books, book chapters and papers in refereed journals

Luiza Olim de Sousa is the niche leader of Environmental Education for Sustainable Development in the Faculty of Education Sciences at the North-West University (South Africa). She has been actively advancing environmental education in pre-service teacher education since 2014. Luiza holds a PhD from the North-West University in environmental management and education for sustainable development.

Schalk Raath is a research fellow at the North-West University (Potchefstroom campus) South Africa in the subject group Geography Education and Environmental Education.

Rudi Pretorius is attached to the Department of Geography at Unisa, where he has been lecturing a variety of sustainability related courses over a number of years. In addition he is the academic coordinator of the undergraduate programme in environmental management. He holds a Master's of Science in Geography and a Master's in Business Leadership. He is chair of the Division of Mathematical and Physical Sciences of the South African Academy of Science and Arts and is studying towards a PhD in Geography, with focus on the role of Geography in education for sustainability in the South African context.

Chris Shiel is Professor in Sustainability & Globalisation in the Faculty of Science & Technology, Bournemouth University. She is the former Director of the Centre for Global Perspectives, a Leadership Foundation Fellow and a Principle Fellow of the Higher Education where she has contributed to developments in internationalisation & sustainability. She was one of the early contributors in the UK, to the concepts of ESD and global citizenship.

Valeria Vargas currently Education for Sustainable Development (ESD) Co-ordinator at Manchester Metropolitan University, Valeria leads the Environmental Management System policy area on ESD. Her work contributed to Manchester Met becoming the UK's first university to achieve the more challenging ISO14001-2015 Certification and, successfully earning top positions of the People and Planet University Green League. For over 10 years, Valeria has applied creative arts including music

and auto ethnographic explorations to foster community resilience and organisational change in areas that support Sustainable Development in both Colombia and the United Kingdom. Her research interests include sustainable development policy for higher education in the context of organisational change and education for sustainable development.

Gregory Trencher is a Visiting Assistant Professor of Environmental Science and Policy at Clark University. A key area of Gregory Trencher's research examines various types of city-level policies targeting existing, private sector buildings. An emerging research agenda concerns smart cities in Japan and China, and in particular, innovation to advance health, well-being and sustainable lifestyles. An established area of research focuses on how university partnerships with stakeholders in industry, government and civil society can function as triggers for environmental, technological and societal transformations in urban and semi-urban settings.

Robert W. Marans is a research professor at the Institute for Social Research and professor emeritus of architecture and urban planning in the Taubman College of Architecture and Urban Planning at the University of Michigan. He is the recipient of the 2012 Career Award of the Environmental Design Research Association (EDRA) and was elected to the College of Fellows of the American Institute of Certified Planners (FAICP) in 2014.He is the co-author of Investigating the Quality of Urban Life: Theory, Methods, and Empirical Research and has lectured extensively throughout the US, and in Europe, Asia, South Africa, South America, Australia, and the Middle East. His current work deals with cultural issues of sustainability and energy conservation in institutional settings including universities and the impact of the built and natural environments on quality of life.