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Universities in Action: Innovative Strategies to Address Climate Change and Promote Health

Fernanda Carvalho[1], Diamantino Henriques[1], Cristina Vasconcelos[2,3], Ana Ferreira[2], and Maria Meirelles[2,4,*]

[1]*Portuguese Institute of the Sea and Atmosphere, Portugal*

[2]*Department of Physics, Chemistry and Engineering Sciences, University of the Azores, Portugal*

[3]*Laboratory for Instrumentation, Biomedical Engineering and Radiation Physics (LIBPhys), Faculty of Science and Technology, Nova School of Science and Technology, Caparica, Portugal*

[4]*OKEANOS - Marine Sciences Research Institute, University of the Azores, Portugal*

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***Corresponding author:** Maria Meirelles, Department of Physics, Chemistry and Engineering Sciences, University of the Azores, Ponta Delgada, 9500-321, Portugal

Abstract

Climate change has a strong global impact, and we are already experiencing this. Scientists are working hard to find innovative sustainable solutions to our problems. Climate change education is a recent expanding phenomenon that is becoming increasingly relevant in the activities of international governmental and non-governmental organizations, with an emphasis on improving public well-being and health. Overall, universities have a crucial role to play in addressing the connections between climate change and health. By taking proactive steps to promote sustainability, facilitate research and education, engage communities and advocate for policy change, universities can help build a more resilient and sustainable future for all.

Through the research carried out, we emphasize the importance of an integrated approach that combines education, research, community engagement and policy advocacy to address current environmental challenges and promote a more sustainable future. The systematic review process described in the article ensures that the findings are based on a comprehensive analysis of relevant literature and projects. This methodological process ensuring that the strategies discussed are well-supported by evidence.

Keywords: Climate change; Health; Universities leaders

Introduction

We highlight the role of universities in promoting sustainability and combating climate change, addressing five essential steps: integrating sustainability into curricula, promoting interdisciplinary research, community engagement, implementing sustainable practices on campus and influencing public policies, Figure 1.

These steps to promote sustainability are purposed and explained by several authors:

i. Campus sustainability initiatives: Universities can take steps to reduce their own carbon footprint and promote sustainability on campus. This can include initiatives such as renewable energy installations, waste reduction and recycling programs, and sustainable transportation options [1,2].

ii. Interdisciplinary research: Addressing the complex challenges of climate change and health requires a multidisciplinary approach. Universities can facilitate collaboration between researchers in fields such as environmental science, public health, and social science to develop innovative solutions [3,4].

iii. Curriculum development: Integrating climate change and health topics into university curricula can help prepare the next generation of leaders to address these issues. This can involve developing new courses or modifying existing ones to include these topics [5,6].

iv. Community engagement: Universities can engage with their local communities to promote awareness of the health impacts of climate change and develop partnerships to address these

issues. This can include working with local health departments, community organizations, and government agencies [7,8].

v. Policy advocacy: Universities can play a role in advocating for policy changes that address the root causes of climate change and its health impacts. This can involve supporting local and national policies that promote sustainability and public health, as well as engaging with policymakers to promote evidence-based decision-making [9].

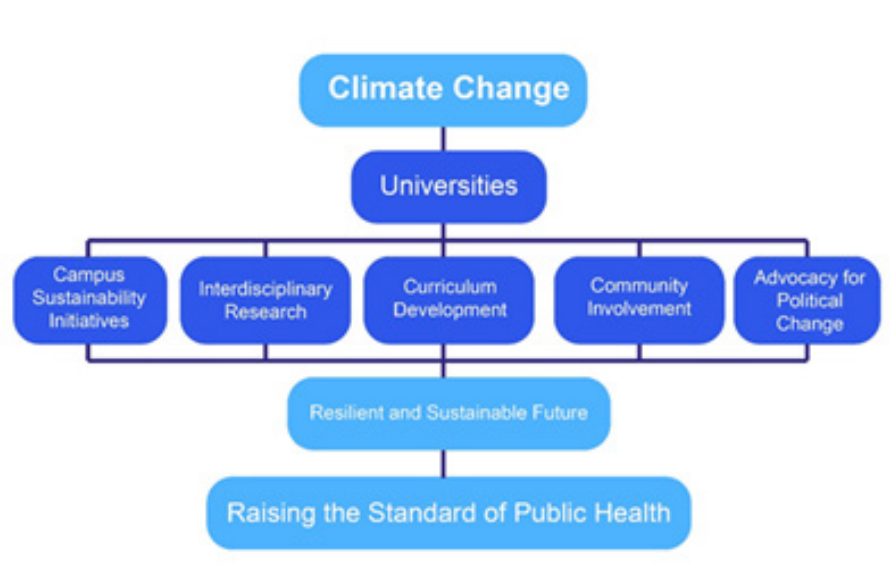

Figure 1: Sustainable Universities: five ways to contribute to a better future.

Recognizing the importance of a sustainable future, many institutions are implementing a variety of policies and initiatives that not only benefit the environment but also serve as educational models for their students and communities. According to [10] as cited by the United Nations Framework Convention on Climate Change (1992), "Education is an essential element for mounting an adequate global response to climate change" [11]. The most compelling demands for climate change education come from medical students themselves, as they anticipate the uncertainties of future practice in a rapidly changing world [12]. And continuing with the same citation, at Stanford University School of Medicine, medical students requested, codesigned, and helped to implement a new elective course in 2020, entitled The Impact of Climate Change on Human Health. The course examines the intersection of climate change and population health, pediatrics, women's health, psychiatry, infectious disease, and disaster management, along with advocacy and the greening of health care. According [13], students from across the university have enrolled in the course and transforming generation: Increasing student awareness about the effects of economic decisions on sustainability. [14] said that education for sustainable development has become increasingly important for higher education institutions and societies in general during the past three decades and thus, has created a more complex environment for operating a higher education institutions. [15] the role of universities in climate change education is of great importance if the scientific, social, environmental and political challenges the world faces are to be met. [16] says that education is the driving force of establishing sustainability since it is one of the main communication vehicles and the basis for the "sustainability mindset". This concept includes "a systemic approach to understanding, one which goes beyond technical knowledge and even understanding the basics of a healthy ecosystem and a thriving society". The collaborative efforts of academic institutions, students, and communities in promoting sustainable practices and policies are essential for driving systemic change. As the global response to climate change intensifies, the educational sector's commitment to sustainability will be crucial in shaping a resilient and sustainable future for all.

Methodology

We conducted a systematic search of titles in two databases, Web of Science and Scopus, covering the period from January 1, 2002, to December 31, 2022. The search strings used included combinations of terms related to 'climate change', 'health', 'interdisciplinary research', and 'university leaders', using Boolean operators (AND, OR) for comprehensive results. Additionally, we searched university repositories and project websites for relevant literature on sustainable development projects led by universities.

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The inclusion criteria were articles published in peer-reviewed journals, studies focusing on the intersection of climate change, health, and higher education and publications in English. The exclusion criteria were articles not available in full text and studies not directly related to the core themes.

The screening process involved two reviewers independently screening titles and abstracts, followed by a full-text review of selected articles. Discrepancies were resolved through discussion. Data extraction focused on study aims, methods, key findings, and relevance to the research objectives. The extracted data were synthesized qualitatively to identify common themes and insights.

Results and Discussion

Inspiring projects around the world

Around the world, there are already several inspiring projects from universities leaders in the area innovative strategies to address climate change and promote health (Table 1).

Table 1: University leaders in projects related to sustainable development.

Title of the Initiative	Project´s Goals	Results in a Sustainable Development Context	Location	References
Health promoting Prisons: Theory to Practice.	Providing health care, synergistic health education, patient education, prevention and other health promotion interventions to meet the assessed needs of the prison population.	The horticulture offers the opportunity to bridge and 'join-up' public health and criminal justice agendas – through enhancing learning and health literacy; building skills and enhancing employability prospects; developing social and interpersonal skills and the competence to maintain family relationships; and promoting models of good citizenship.	University of Central Lancashire, UK.	[17]
Sustainability Leadership Development Program (SLDP).	To assess the impact of a sustainability leadership development program (SLDP) designed to develop staff members as leaders who encourage sustainability practices within institutions of higher education (IHE).	At the institutional level, the SLDP disseminated the college's socioenvironmental mission statement, increased its administration's commitment and involvement, served as a platform for addressing local socioenvironmental problems and Faculty of Science, Kibbutzim College of Education, Technology and Arts, Tel-Aviv, Israel. • Iris Alkaher & Ilana Avissar (2018). initiated an Education-for Sustainability (EfS) activists' network.	Faculty of Science, Kibbutzim College of Education, Technology and Arts, Tel-Aviv, Israel.	[18]
Work Environment and Climate Study (ARK).	Intervention approach to improve the health and wellbeing of academic staff.	The survey has collected information on employees' perceptions of the psychosocial work environment, well-being, and health from over 15,000 respondents. This understanding can inform and inspire the planning of future Health Promoting University initiatives to meet the distinctive needs of its employees.	18 universities and university colleges in Norway.	[19]
Global Futures	Global Futures is a far-reaching platform that seeks to keep Earth habitable for humans in the long term and improve human well-being.	With a holistic systems approach, Global Futures explores which critical interventions will steer us toward a sustainable, globally connected future. Under the core theme of planetary management, Global Futures' research agenda includes focal areas such as the dynamics of societal structures and their stability, new energy systems, new economies (such as a carbon economy), food security, land degradation, health delivery systems, depletion of natural resources, water scarcity, future cities and extremes.	Arizona State University.	[20]
Position - American College of Physicians (ACP).	Physicians and the broader health care community throughout the world engage in environmentally sustainable practices that reduce carbon emissions; support efforts to mitigate and adapt to the effects of climate change; and educate the public, their colleagues, their community, and lawmakers about the health risks posed by climate change.	The medical profession must be at the fore of this opportunity to make Earth a sustainable home for future generations.	American College of Physicians, Washington, DC.	[21]

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Urban Africa: Risk Knowledge (Urban ARK) Programme.	Mixed-methods analysis of the heat-health vulnerability of informal settlement residents in Dar es Salaam, Tanzania.	The results of this research suggest that increasing temperatures due to climate change will likely be a significant risk to human health in Africa, because informal settlement residents have high exposure, high sensitivity and low adaptive capacity to heat, and because the heat-health relationship is currently an under-prioritized policy issue.	University of Cape Town, South Afric.	[22]
Re-Purposing Universities for Sustainable Human Progress.	Explores what climate emergency declarations show about how UK universities are responding to climate change and wider sustainability concerns, as well as how they view and present themselves in relation to this.	There remains an important difference between the specific commitments in the declarations, and arguments for more far reaching reorientation of purpose and practice of the sector. Staff and students are frequently mentioned within universities' declarations, and it is likely— indeed essential—that universities will be held to account by these groups for the level of action they pursue following their declarations. The declaration of a climate emergency is only a starting point but provides a firm basis for demanding institutions live in UK Universities. • Briony Latter & Stuart Capstick (2021). up to the promises and aspirations they have put forward.	UK Universities.	[23]
Community University Knowledge Strategy for London – Collaborate.	Improve London-wide community-university engagement. A need identified by Just Space, a network of grassroots community groups who have more than 13 years' experience working with universities in London in teaching, research, and public engagement.	Repurposing the universities for sustainable human progress requires expanding the range of stakeholders and partners they engage with and the quality of that engagement.	Just Space and University College London (UCL).	[24]
Climate Change Impact on the Azores Context (CIAo).	To research the role of Climate Change (CC) in relevant economic and social activities in the Azores region.	It led to the development of the knowledge of climate change at the scale of the Azores region.	University of the Azores and Portuguese Institute of the Sea and Atmosphere.	[25]
Harvard Graduate School of Education (HGSE).	Harvard University operates with a mission to institutionalize best practices in sustainable operations and translate research and teaching into practice by using the campus to pilot innovative solutions that can be widely replicated.	Educating future leaders within schools of education, is a step closer in the right direction of attaining a sustainable future for all.	Harvard Graduate School of Education Harvard University Cambridge, MA, USA.	[26]
Perceptions of Climate-friendly Behaviors and Frequency of Red Meat Intake.	Evaluate university students' perceptions of climate-friendly behaviors and to assess how these perceptions are associated with the frequency of red meat intake.	Sustainability motivations and perceptions of meat's climate impact were associated with lower frequency of red meat intake, despite the overall moderate rating of eating less meat as an effective climate change mitigator. This research lends support to behavioral interventions, public education campaigns, and policies aiming to reinforce sustainable dietary patterns in young adults.	Public Michigan University and Public California University.	[27]

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The topics covered in Table 1, are diverse but all related to sustainability, health, and well-being. Overall, these topics illustrate the importance of sustainability, health, and well-being in various settings and highlight the need for interventions in education, research, and collaboration to address these critical issues. So, it is necessary to have a holistic approach that incorporates interdisciplinary research, community engagement, education and public policies.

By educating and training leaders in sustainable practices, universities ensure that future generations are better prepared to make informed and responsible decisions. By promoting interdisciplinary research, we are often driving innovation, resulting in more effective solutions to environmental challenges, benefiting both academia and industry. Partnerships between universities and local communities can lead to more effective sustainability initiatives tailored to the specific needs of the community. Universities that implement sustainable practices on their campus serve as a practical and motivational example for other organizations, demonstrating that sustainability is attainable and beneficial. By contributing to the formulation of public policies, universities can help create an ecosystem that favors sustainability at a national and international level. Implications such as those referenced highlight the importance of an integrated and multifaceted approach to promoting sustainability across universities.

Inspiring projects - case study - Azores

The University of the Azores (UAc) has a long tradition of participation in national and international projects, especially in the field of climate and environmental sciences of which the following are examples:

(i) Rethink Action is funded under the Horizon 2020-EU.3.5 Programme; the project brings together thirteen partners from nine countries, combining various fields of expertise such as social sciences, political science, land use-based policy, environmental sciences, atmospheric sciences, ICT modelling, integrated assessment modelling, earth observation, climatology and communication (Rethink Action, 2021); (ii) (SOCLIMPACT, 2017), project for DownScaling CLImate imPACTs and decarbonisation pathways in EU islands and enhanced socioeconomic and non-market evaluation of Climate Change for EU, for 2050 and beyond (Soclimpact, 2020); (iii) (Green Islands MIT Project, 2009), focused on matching islands energy demands and supplies through new business innovation and (iv) Pico NARE (North Atlantic Regional Experience/Pico Mountain Observatory) (since 2000) is a project/program for monitoring the atmospheric background composition in the North Atlantic (Pico NARE, 2000). Local and national partnerships with the Portuguese Institute for the Sea and Atmosphere and other public institutions especially linked to health are also relevant, as is the CIAo (**C**limate Change **I**mpact on the **A**zores C**o**ntext) action Table 2.

Table 2: University of the Azores – participation in national and international projects.

Initiative	Project´s Goals	Sustainable Development Context	Location	References
Pico NARE (North Atlantic Regional Experience/Pico Mountain Observatory).	Is a project/program for monitoring the atmospheric background composition in the North Atlantic (since 2000).	Anthropogenic combustion processes result mostly from fossil fuels, which contribute to global warming. The measurements performed allow the assessment of the transport of pollutants originating from natural and anthropogenic combustion processes.	Pico island (Azores)	[28-34]
Green Islands MIT Project	The project was focused on matching islands energy demands and supplies through new business innovation The project aims at making the Azorean islands a model for reducing carbon emissions and fight climate changes (2009-2012).	This project allowed the creation of synergies and partnerships in the areas of renewable energy (solar and wind) and mobility (electric vehicles).	Azores archipelago	[35]
SOCLIMPACT project for DownScaling CLImate imPACTs and decarbonisation pathways in EU islands and enhanced socioeconomic and non-market evaluation os Climate Change for EU, for 2050 and beyond (2017-2021).	This project had the following goals: (1) Developing a thorough understanding on how Climate Change (CC) will impact the EU islands located in different regions (Cyprus, Malta, Fehmarn, Balearic, Sicily, Sardinia, Corsica, Crete, Azores, Madeira, Canary, Martinique and Guadalupe); (2) contributing to the improvement of the economic valuation of climate impacts; (3) increasing the effectiveness of the economic modelling of climate impact chains; (4) facilitating climate-related policy decision making for Blue Growth; (5) delivering accurate information to policy makers and other relevant stakeholders.	SOCLIMPACT provided tools for assessing the impacts on the climate induced by different economic activities, thus contributing to sustainability and increasing the value chain.	EU islands	[36-38]

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Rethink Action is funded under the Horizon 2020-EU.3.5 Programme. modelling, earth observation, climatology, and communication.	Rethink Action supports the objectives of the EU Green Deal. This and related frameworks and regulations are in line with the Paris Agreement, which points to the critical role of the land use planning in reaching the long-term climate mitigation objectives. Land resources are also fundamental, even critical, to reach climate objectives and specific Sustainable Development Goals (SDGs).	(at the moment there is no information)	EU	(at the moment there is no information)
Climate Change **I**mpact on the **A**zores C**o**ntext (CIAo)	To research the role of Climate Change (CC) in relevant economic and social activities in the Azores region.	It led to the development of the knowledge of CC at the scale of the Azores region.	Azores archipelago	[39]

The integration of topics related to Climate Change and the Environment in the curricula of the various courses at universities is a reality, and also a concern in the curricula at UAc. These disciplines are taught by specialists in each specific area, and students are encouraged to deepen their investigation. From social sciences to economics, from technologies to agricultural sciences, from biology to biomedical sciences, the impacts of Climate Change, its mitigation and adaptation are addressed in the context of the Azores. Since 2022, UAc has been developing specific projects of environmental research and/or climate change related to human health, namely the study of respiratory and cardiovascular diseases.

UAc maintains partnerships with regional health units in the scope of research on the effects of atmospheric variables (meteorology/climate and atmosphere composition) on human health. The impact of atmospheric factors on human health or, if we want to be more specific, their effective contribution in triggering and exacerbating certain diseases, has been increasingly the target of scientific research for different locations and with diverse methodologies, gaining special importance with Climate Change. So, and in the area of health and human welfare the UAc has been working with a focus on the following proposals for future actions: (i) promote an evaluation study of the indoor environmental conditions in closed spaces (day-care centers, schools, homes, residences) in the context of the Climate Change expected for the Azores region; (ii) develop studies to clarify the mechanism of the interrelationship between environmental determinants to identify high-risk groups and key environmental factor exposures; (iii) contribute to raising awareness among the population to reduce exposure to potential respiratory disease exacerbates; (iv) contribute to improving management of the hospital admission process; (v) contribute to the design of a possible environmental alert system for some (respiratory and cardiovascular) diseases; (vi) proposing new research projects in the areas of (a) exposure of workers to UV radiation, and (b) atmospheric iodine.

The Azores University participates (scientific research and technical scientific advice) in the development and application of sustainability policies in the Azores region, in relevant areas such as energy transition, land use, fisheries, agriculture or biodiversity; supports and promotes workshops, symposia and conferences to promote sustainability, public health, environment, circular economy and all socio-economic policies that contribute to Planetary Health. So, it is necessaire a holistic approach that incorporates interdisciplinary research, community engagement, education and public policies. Also, the article emphasizes the need for a multidisciplinary approach to tackle complex challenges. This includes collaboration between environmental science, public health, social science, and other fields, which is an innovative method for creating comprehensive solutions.

By presenting real-world examples and case studies from different universities around the world, the article provides practical insights and innovative strategies that have been successfully implemented. This includes projects like the Work Environment and Climate Study (ARK) in Norway and the Global Futures project at Arizona State University. Highlighting the role of universities in advocating for policy changes and engaging with local communities is a novel aspect. This approach not only promotes sustainability but also helps in educating and involving the public in climate change initiatives, which can lead to more effective and sustainable outcomes.

Conclusion

This article explores the crucial role of universities in promoting sustainability and combating climate change. Through a comprehensive analysis, it identifies five essential steps that higher education institutions can adopt: integrating sustainability into their curricula, promoting interdisciplinary research, engaging with the community, implementing sustainable campus practices, and influencing public policies. Examples of successful initiatives, such as the Sustainability Leadership Development Program and the Health Promoting Prisons initiative, are discussed to illustrate how universities are leading the change. Some recommendations to enhance university engagement on climate change and promote health are that universities should:

a) promote a culture of environmental responsibility

b) encourage interdisciplinary research to improve the resolution of complex challenges

c) advocate and support reforms or new public policies aligned with environmental and health concerns.

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The article concludes by emphasizing the need for a holistic approach, combining education, research, community engagement, and policy advocacy to address contemporary environmental challenges and create a more sustainable future.

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