

Editorial

Sustainability: A Crucial Quest for Humanity –

Welcome to a New Open Access Journal for a Growing Multidisciplinary Community

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Sustainability, although often hard to define precisely, is a rapidly growing area of study that is becoming increasingly applied in diverse areas. The definition put forth in 1983 by the World Commission on Environment and Development, informally known as the Brundtland Commission, captures many aspects of the topic. That commission defined sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” Other attempts have been made to define what we mean when we refer to sustainability or strive to achieve it as an objective. Despite the differences in definitions, a key theme that emerges is that sustainability is a concept that needs to be incorporated in many if not all of the activities that people undertake.

The multidisciplinary nature of sustainability is truly astounding, with its implications affecting fields as diverse as science and engineering, environment and ecology, economics and business, sociology and philosophy, and many others. Perhaps this breadth is not surprising, given that sustainable development has been for some years identified as having environmental, economic, social and cultural dimensions. For instance, addressing sustainability requires consideration of resource use (materials and energy), economic and social development, health, environmental stewardship, engineering methods and design, and architecture, as well as an understanding of how people interact and relate in addressing these factors.

The manner in which sustainability applies often varies with the field. Take, for example, the topic of energy. The development of sustainable energy systems is indeed a great challenge, as civilization is highly dependent on non-sustainable energy resources, particularly fossil fuels, which contribute significantly to environmental impacts like climate change. Yet, energy resources are important, driving much of the global economy and contributing to good living standards. Consequently, efforts

are needed to enhance the viability of sustainable energy resources, like solar and wind energy, and to improve production processes for energy carriers that facilitate their use, such as hydrogen. Improvements are also required in the way energy resources are used in meeting societal needs. In all parts of energy systems, greater efficiency can contribute to energy sustainability, and can be attained by exploiting modern techniques like exergy analysis. Better economic and environmental performance is also essential if energy systems are to become more sustainable. Furthermore, issues like continuing population growth and rapidly rising affluence in many parts of the world, which increase the demand for energy resources, also must be addressed given the significant implications they have on the sustainability of energy systems. Contributions in these areas can help make energy utilization more sustainable and thereby support broader efforts to achieve sustainable development.

Similarly, supplying the world's needs for materials has become a major task for scientists and engineers, as well as those who make and implement policy. Like energy, materials are key to modern societies and many issues relating to sustainability stem from materials problems.

Yet the concerns embodied by sustainability are broader, covering such issues as climate change and pollution, management of wastes (whether toxic, hazardous, radioactive or conventional), sanitation, land use and desertification, species extinction and loss of biodiversity, ecosystem degradation, water quality and drought, industrial development, production and consumption patterns, population growth, urbanization, globalization, cultural and social sustainability, natural and anthropogenic disasters, peace and stability and government policies. The factors to be considered in addressing sustainability can seem unending.

But progress is being made. Numerous approaches to sustainable development have been put forward from many perspectives. Some socio-economic approaches include the development of national policies and international agreements for sustainable development, approaching aspects of sustainable development via ethical and philosophical considerations, the provision of education about sustainability and raising awareness of it, and modifying lifestyles. In addition, many researchers are investigating the impact of sustainability on cultural diversity, social systems, globalization and immigration patterns, as well as the impacts of these topics on sustainability. Studies into the impact of unsustainable activity are also being carried out, such as research on the effects of food shortages on social relations and uses of natural resources and the environment. Numerous technical approaches have also been proposed, including making the utilization of land, water, air and biological resources more sustainable, applying resource regeneration and preventive health care, increasing the use of renewable resources, and preserving ecosystems and biodiversity. These and the many more examples that can be cited give hope for the future.

Despite the growing interest in and need for sustainability, new developments and advances are required before sustainability can be more widely incorporated into the activities of industry, government and society. The wealth of questions that arises when dealing with sustainability is believed by many to require the development of comprehensive approaches and procedures. At the same time, others suggest that a comprehensive, multidisciplinary approach cannot resolve all of the issues surrounding sustainability and can in fact sometimes create more questions, making it difficult to develop universal and widely accepted approaches to sustainability. These ideas suggest that discipline-specific sustainability approaches are also needed. More broadly, research is needed to guide

the development of appropriate sustainability measures, strategies and policy. Such efforts often need to take a multidisciplinary approach in which technical, environmental, economic, societal and cultural issues are addressed.

Increasing numbers of researchers around the world are engaged in sustainability research, covering societal, environmental, technical, health and other fields. Sustainability research is usually reported in specialized journals relevant to the application field. As the field broadens and the need for interaction among sustainability researchers in different fields grows, the need heightens for a multidisciplinary journal dedicated solely to sustainability and its many facets. Such a focal publication enables fruitful and cross-fertilizing discussions between researchers from different fields, often to the benefit of all.

The journal *Sustainability* has been launched to meet this need, and should be of interest to anyone working on sustainability and its applications. As an international and multidisciplinary scholarly journal, with articles ranging across technical, environmental, cultural, economic and social realms, *Sustainability* provides a forum for research related to sustainability and sustainable development. Researchers are encouraged to publish their theoretical, computational and experimental research relating to sustainability, whether from the natural and applied sciences, or social sciences, or humanities, to promote and facilitate sustainable development. In addition, reports concerning research collaborations and projects by governments and others, which can provide useful knowledge and guidance to a broad array of readers, are also welcome. The journal also intends to provide a forum for ideas that challenge convention, step outside of accepted paradigms and provoke new ideas.

To ensure important aspects of sustainability receive adequate attention, the journal intends to publish many special issues dedicated to focused and important topics. Several special issues, which in some ways help define *Sustainability*, are already planned on such topics as atmospheric pollution, exobiology and life on the planet, land use, renewable agriculture, renewable energy, water management, the ecological footprint indicator and the future of sustainability.

To adequately represent the breadth of the topic of sustainability, eminent associate editors have been appointed from different fields. Furthermore, a diverse editorial board of highly qualified experts from many disciplines has been appointed, as can be observed on the journal's web site.

A special aspect of *Sustainability* is that it is an open-access journal. Open access provides several advantages, including free access via the web for anyone interested, the ability to include electronic files and software as supplementary material as well as color figures at no cost, rapid publication, and the ability to reach many readers, including those without access to expensive subscriber journals. The latter point suggests that the long-term impact of the journal will be high. The open access feature is important given the rapidly growing research community across the world, including many countries that have not historically been very active in this area. Thus, the journal provides straightforward and inexpensive access to high-quality research for as many researchers and other interested readers as possible.

I expect that *Sustainability* will become a premier journal for multidisciplinary research on sustainability and sustainable development worldwide. To achieve this objective, all members of the editorial and production offices will work hard to provide the best service possible. We hope to see *Sustainability* report important advances in technology and systems as well as processes and methods, and as a consequence improve decision making and policy development regarding sustainability. But

we depend on you, our potential authors, to submit high-quality, original articles that provide sustainable solutions, solve challenges and attract attention. So, I invite you to submit original, high-quality research as well as comprehensive review articles to *Sustainability*, and thereby help humanity on its crucial quest for sustainability.

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