

## Foreword

Increased population growth, environmental emissions, water use, energy use, and consumption of various natural resources are some of the drivers that contribute to current global challenges such rising sea-level, increased frequency and intensity of disasters, increased poverty, and increased health issues. Increasing levels of these drivers are unsustainable with an urgent need for development and implementation of mechanisms to decrease them while still maintaining societal health and wealth.

Development of new and sustainable technologies, processes, and activities provide a way to address these drivers while at the same time improving human lives (social progress) through better, smarter ways of conducting activities. This also has the potential to spur economic development provided that the new sustainable mechanisms and strategies are cost-effective. Sustainable development is defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987). While there is no consensus on the definition of sustainability, what is clear is that it strives for the maintenance of economic, environmental, and societal well-being of all individuals, communities, and the environment (Muga & Mihelcic, 2008). Further, it recognizes the need to design human and industrial systems that ensure the proper use of natural resources to support current and future generations without adverse impacts on social conditions, human health and the environment (Mihelcic et al., 2003).

Since the advent of the concept of sustainability/sustainable development, a plethora of innovative sustainable practices such as improved products, processes, services, policies, and organizational and management strategies have since been implemented and integrated into the various facets of society. For example, at the global level, organizations such as the United Nations and the World Bank strive for the improvement of the lives of individuals in struggling economies in the Global South. At the country or national-level, practitioners and policy-makers strive for the use of alternative energy use, alternative building materials, access to clean water, and the use of technologies that reduce or capture carbon dioxide emissions. At the community or household level, especially in the Global South, there is repurposing of items to extend usefulness, teaching of community members to conserve resources and be thrifty while diffusing vital survival skills of sustainable practices to the youth. At the educational institutional-level, educators strive to incorporate the theories, concepts and application of sustainability into their curriculum.

Sustainable development has been playing a role in our daily lives since the 1960s and will continue to play a larger and larger role well into the 21<sup>st</sup> century. Professionals, decision-makers, scientists, engineers, and other stakeholders, have been turning to sustainable practices as a way of doing business. Environmentally-consciousness businesses have been and continue to look for ways to reduce cost, make their products more efficiently, reduce their environmental footprint, and comply with increas-

ingly stringent environmental regulations. In the construction industry, engineers continue to look for alternative, environmentally safe, construction materials. This endeavor has been more pronounced in developing nations, where there has been a push to build infrastructure, e.g. houses, from locally available, indigenous materials such as bamboo. In the energy sector, relevant stakeholders strive for the diffusion and use of alternative energy such as solar panels, wind-turbines, and geothermal as a way of reducing carbon dioxide and reliance on fossil fuel. In academic institutions, educators have been and continue to strive to incorporate sustainability concepts, theories, and case studies into their curriculum. In essence, sustainable practices are becoming the norm in today's society. What remains to be explored and captured is how much of the innovative sustainable practices have enhanced and contributed to economic growth in society. A common objective of this work is to shed some light into sustainable development and economic development.

This book provides a valuable window into:

1. The development of sustainable healthy communities and cities,
2. The different types of energy options available for a sustainable future,
3. How sustainable development contributes to business, and
4. The different information and communication technologies available for sustaining livelihoods.

The development and implementation of sustainable healthy communities and cities is directly and indirectly linked to economic development and growth. For example, access to basic health services such as water and sanitation services is linked to improved health of a person and ultimately a functioning, contributing member of society. Lack of access to these services renders a person a burden to society. Energy options are also linked to economic development and growth. Sustainable energy options such as solar and wind turbines emit less carbon dioxide into the atmosphere. While these options may incur high start-up costs and a longer time to break-even, they save the user significant money over its lifetime. A win-win scenario for manufacturers of solar and wind turbines and users would be a low start-up cost and therefore shorter time to break-even. Incorporating sustainable practices in industrial processes (e.g. in mining, manufacturing) is also important to the triple bottom line. Process improvement, e.g. improvement in energy efficiency or material efficiency, can lead to reduction in carbon emissions and possibly enable a business to participate in carbon trading.

The challenges in developing and implementing sustainable practices that make economic sense are both difficult and interesting. Professionals, businesses, decision-makers, scientists, engineers, and other stakeholders have been working on developing new sustainable technologies, processes, activities and policies, to address current global challenges. Because of the interconnectedness of sustainable development and economics, it is necessary to provide practitioners, both professionals and students, with state-of-the art knowledge on the frontiers on these two topics. This book is a good step in that direction.

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