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Sustainable development in the Arab world – is the Gulf Cooperation Council (GCC) region fit for the challenge?

Esmat Zaidan , Mohammad Al-Saidi  and Suzanne H. Hammad

Introduction – a special regional context

The Gulf Cooperation Council (GCC) region and the wider Arab world are faced with multiple interconnected dilemmas embedded in the social, economic, and environmental pillars of sustainable development. The question of how to design effective sustainability strategies that are aligned with the context of the GCC region is a relevant one. In this special issue, contributors have investigated the obstacles to sustainable development in the GCC region, the impact of current development patterns on the sustainability agenda, and the way in which countries react to local, regional, and global sustainability pressures and debates. The issue aimed to provide a platform for academics to present policy-relevant research and practical steps being taken towards realising genuine sustainable development within the GCC region, while teasing out the major obstacles to this process. This regional focus is motivated by the shared challenge of GCC countries of reforming carbon-based economies as well as their systems of high subsidisation and universal benefits in order to incorporate sustainable concerns, merit-based rules, and more targeted policies. While these challenges are shared with other Arab countries, as well as other countries exporting oil and gas, the origins, current patterns, and future directions of sustainability reforms in the GCC region reveal interesting lessons to be learnt.

The countries of the GCC (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE)) are home to a large supply of fossil fuels and various types of minerals, and they are rich with regard to Arabic and Islamic culture and history. The economies of the GCC countries are characterised by their heavy dependence on exports of fossil fuels. These exports have generated significant revenues that have resulted in high per-capita income levels and decent living standards. Since the 1970s, the dominant development view in the region centred on economic growth, wide job creation through public jobs for national citizens, a heavy reliance on immigrant workers, and an ecosystem for a comprehensive distribution of economic and social benefits among nationals. Owing to the significant revenues generated from oil and gas as well as the ambitious plans of the leadership within the GCC, the GCC nations have transformed into very modern states during the past few decades. Recently, the fiscal sustainability of this model has been questioned in response to increasing demands from the growing population and economies for natural resources and for financial support. It is this factor that has made the biggest contribution to the sense of urgency regarding sustainability reforms in the region.

Collectively, the GCC nations have a population of more than 40 million people. The region is one of the most urbanised in the world, with around 80% of the population residing in urban areas, mostly in close proximity to coasts where important ecosystems and cultural heritage are located. Roughly 40% of the GCC region's population are people born outside the region, of which the majority are Asian migrant labourers. Overall population growth is continuously increasing due to high fertility rates among nationals and the influx of foreign workers. The high portion of foreign workers has

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given rise to various social and cultural debates related, for example, to identity, dependence, and diversity. In response, GCC countries have sought to increase local capacities through education, nationalisation of human resources, or promotion of entrepreneurship ideals among the local population.

To date, most sustainability research has been conducted in other regions, particularly in developed and emerging countries. We contend that there remains a distinct knowledge gap regarding the sustainability journey within other settings, and sought to rectify this through the valuable contributions in this special issue. These contributions have provided a much-needed regional focus and unravelled context-specific influences on the transition of GCC states towards a holistic sustainability agenda, discussing emerging trends and initiatives, and taking stock of practical lessons pertinent for the GCC region. Some of the obstacles to sustainability have been brought to the fore, including high energy subsidies and large footprints, the lack of renewables and low prioritisation of environmental sustainability, and the entanglement of socio-political realities with the realisation of truly sustainable policies and programmes.

Papers in this special issue have highlighted how the GCC region has a special context in the wider Arab region in terms of being historically reluctant to effectively engage with the global sustainability agenda advocated by developed countries (Al-Saidi, Zaidan, and Hammad 2019). This is despite the openness of the region to adopt westernised concepts and embrace state-of-the-art technologies and design concepts (Al-Zo'by 2019; Zaidan 2019). This apparent paradox is explained by the cautious approach of GCC countries towards sustainability in order to protect their carbon-based economies. The preferred path GCC countries are following is to learn from international best practices in order to address more pressing issues, such as the resilience of coastal areas, resource provision through clean technologies such as reuse and renewables options, addressing environmental risks to their coastal cities, or improving the sustainability engagement of local stakeholders (Abulibdeh, Al-Awadhi, and Al-Barwani 2019; Abulibdeh, Zaidan, and Al-Saidi 2019; Al-Awadhi, Charabi, and Choudri 2019; Al-Saidi and Lahham 2019; Hayman 2019). In contrast, other regions in the Arab world might not have the luxury of monetary revenues to selectively and gradually embrace sustainability. For example, due to rising demand and limited energy sources, Morocco has set a renewables target of more than 50% by 2030, far more ambitious than any GCC country. Furthermore, for countries such as Lebanon, the provision of sufficient food and basic education for growing populations, including huge numbers of refugees, is a real challenge that spurs projects using innovations such as urban agriculture (Albakri and Shibly 2019; Dehnavi and Suß 2019). In contrast, access to food, energy, and water, alongside other comforts such as public jobs and good salaries, have been a prerogative of GCC citizens. In the GCC, sustainability is increasingly being perceived as a policy imperative of the twenty-first century, but also as a beneficial tool to sustain the basic functioning of a growing economy within healthy environmental boundaries. Furthermore, it represents a vehicle for states to gain legitimacy on the international scene in terms of being responsible towards the global community and caring about shared norms and challenges.

Common grand challenges

Controlled development

During the last three decades, GCC countries have experienced economic growth at a remarkable pace. The consequences are tangible in terms of rising demand, urbanisation challenges, demographic changes, and pressures on limited natural resources. Countries have reacted through measures to control this rapid development, for example, limiting citizenship and residency rights, investing in local education and education capacities, promoting the transfer of knowledge from foreign workers to locals, and incentivising locals to take up employment in the private sector. Such measures have been limited as they have not addressed consumption patterns or the limitations of available space and ecosystems' carrying capacity. As we will explain later, policies targeting

these aspects have recently been embedded within a larger move to foster the development of alternative resources, both economically and environmentally.

A good example of this issue of rapid development are the urbanisation challenges discussed in the special issue (Abulibdeh, Al-Awadhi, and Al-Barwani 2019; Al-Awadhi, Charabi, and Choudri 2019; Zaidan 2019). The transformation towards extreme levels of urbanisation in the GCC region has created design and cultural identity challenges, as well as risks related to coastal management or natural hazards. However, it has also put the cities at the forefront of global development, as they no longer operate as places solely for settlement, production, and amenities. These cities now exert a significant influence on social and political relations at all levels and have been transformed into significant epicentres of power and politics, shaping the achievement of national visions and influencing policy outcomes. The transformation to a significant urban setting is not simply a demographic phenomenon shaped by an expected movement of people from other areas and regions in the world. Instead, it is a continuously changing process that reflects several other aspects of development. Controlling the development of these cities also has a significant influence on environmental and sustainability efforts. The transformation of these cities in terms of sustainable living and environmentally friendly architecture, reflecting local cultures instead of westernisation patterns, is a fundamental prerequisite for transition towards sustainability in the region.

Risks to natural resources from unnatural growth

The region's natural resources have been subjected to substantial stress and depletion due to uncontrolled demographic and economic development, improperly planned rapid urbanisation, resource-intensive consumption, and the expansion of irrigation systems on local farms. The situation is expected to become more severe given the problems posed by climate change. The resulting environmental challenges can limit future growth potential and expose the region to a combination of natural and man-made environmental risks. The issue of managing arising risks and potential disasters from the increased use of natural resources has received little attention in policymaking and literature on the region. This is particularly true for the challenges arising from the management of water, energy, and land resources (Abulibdeh, Zaidan, and Al-Saidi 2019), or the risks to supply systems arising from global change or the increased integration and coupling of these systems (Al-Saidi and Saliba 2019).

The inclusion of risk management systems is an increasingly common practice around the world but is still underrepresented in the GCC region. The damage from natural disasters (e.g. climate change variability issues such as heatwaves, storms, and sea-level rise) and man-made ones (e.g. oil spills, breakouts in supply systems, cyberattacks) can impact on infrastructure and ecosystems. For example, a substantial decrease in the local agricultural output as well as in the ability to import adequate food products may threaten local or regional food security, leading to further regional instability. The negative impacts of increasing risks to the basic supply of water, food, and energy resources are important issues to be tackled in future policies. In this context, food security has proven to be a critical issue for the Gulf countries, while efforts to improve this by increasing local agriculture have contributed to the depletion of significant portions of non-renewable groundwater resources (Saif, Mezher, and Arafat 2014). Failure to ensure the security of basic supply can lead to negative implications such as the disruption of the social contract and redistributive strategies, which presently outline state–society relations. Furthermore, increased food prices due to dependence on international markets have caused macro-economic and political instabilities around the Arab region; for example, the food price hikes in 2011 (due to a severe drought in China) and their contribution to the Arab Spring uprising (Sternberg 2012).

The response strategies of the GCC countries should centre on improving resource-use efficiency, increasing conservation and protection efforts, and finding alternative resources such as reused water or sustainable agriculture (Abulibdeh, Zaidan, and Al-Saidi 2019; Brown, Das, and Al-Saidi 2018). Furthermore, there are substantial threats from the immense transformation of coastal habitats

through dredging and the conversion of productive intertidal areas into land fit for tourism resorts, industrial facilities, causeways, recreation, and real estate (Burt et al. 2017). Despite this transformation, decreasing coastal pollution and restoring degraded habitats seem to be overlooked by policymakers in the GCC region. Proper management and conservation of marine ecosystems are crucial for GCC countries to allow them to potentially increase their mean per capita fish consumption and decrease their reliance on imports. In addition, it will enable them to sustain vital ecosystems and dependent economic sectors such as tourism.

Balancing sustainable development responsibilities

The sustainable development responsibilities of GCC countries are not entirely aligned to environmental protection and sound utilisation of natural resources. They also arise from other commitments such as maintaining the current good coverage of basic services, improving the capabilities of marginalised or underrepresented groups, and engaging in the global sustainability agenda. Due to rapid urbanisation as well as economic and demographic growth patterns, keeping up with demands for basic services in the hot and arid climate of the GCC is challenging. For example, electricity demand is rising and may increase even further with climate change, while the bulk of energy use is for air conditioning and water produced from desalination processes. In light of these local sustainability challenges, the region has initiated measures to transform the built environment and deploy efficient technologies, including renewables, in order to bring about an ecological modernisation and, at the same time, deliver outcomes in accordance with parts of the global sustainability agenda, such as the 2015 Paris Agreement (Al-Saidi and Elagib 2018). Furthermore, according to Al-Saidi, Zaidan, and Hammad (2019), GCC countries have shown more engagement in recent years towards the global sustainability agenda, undertaking more reforms, realigning some strategies to global goals (particularly the build environment and use of renewables), and joining international regimes.

Hayman (2019) highlights how civil society in the region can contribute to the global sustainability agenda through the Sustainable Development Goals (SDGs), by co-developing, monitoring, implementing, and advocating for sustainability targets. Although this role is critical, civil society still faces important challenges in the region and should be strengthened and supported. The role of social equity and education for all, particularly those marginalised by conflict or humanitarian strife, is upheld by civil society and donor organisations in close collaboration with host governments, as elaborated in the case study of sustainable education programming for Syrian refugees in Lebanon (Albakri and Shibly 2019). While this issue has not addressed the health dimension of sustainability, this is another important area to consider, along with the significant role played by women in the region. This is particularly true when it comes to the labour force and any future diversification efforts. Women in the GCC region have been deprived of several rights, some so basic as the right to drive a car until recently in Saudi Arabia. Despite positive signs, women still suffer from inequalities such as discrimination in the workplace, being overlooked for promotions and unable to undertake certain employment opportunities deemed dangerous by decision-makers and therefore reserved for men (Al-Waqfi and Abdalla Al-faki 2015; Salem and Yount 2019). The SDGs' emphasis on multisectoral partnership within and beyond borders is contingent upon enhancing the effectiveness of existing collaborations and innovating with new ones that promote the sustainability agenda and instil ownership.

Old but recurrent themes

The lasting search for diversification

Economic diversification is an old theme in the development strategies of the GCC region. For example, diversification has been the main objective of 10 development plans in Saudi Arabia

issued since the 1970s, with little success so far in significantly increasing the economic contribution of the non-oil sector to GDP (around 51% in 2011–2013, 64% in 1996–2000, 62% in 1986–1990, and 41% in 1970–1975) (Albassam 2015). Diversification has always gained urgency at times when oil and gas prices were low. Since the fall in oil prices in 2014, and during the current phase shaped by formalised and ambitious national visions, economic diversification is again a prime objective of development strategies. In order to diversify their fossil fuel-based economies, GCC countries are investing a large proportion of their petrodollars in supporting start-ups, encouraging entrepreneurship, increasing marketable research outcomes, and providing employment opportunities for local citizens. However, owing to the unstable nature of global oil prices, GCC countries are likely to face hardships if they depend only on state-run diversification initiatives and on investment by public companies.

Undergoing diversification requires multiple reforms, including financial market deepening, workforce changes (e.g. nationalisation of jobs to create sustainability), privatisation, and addressing the bureaucratic, legal, and organisational challenges to widening private sector involvement. Although the region's economic diversification is far from over, in recent years, the non-oil sector has grown. GCC-wide, the proportion of oil in GDP fell from 45% in 2013 to 26.3% in 2017 (GCCSTAT 2018). Mainly due to the fall in oil prices, the non-oil sector has experienced an average growth rate of 5.5% while the oil sector has shrunk at an average of 9.8% in 2013–2017, registering a growth of 22.1% only in 2017 (GCC-STAT).

Diversification efforts in the GCC are uneven in terms of sectors and countries. For example, some emerging industries, such as in Saudi Arabia, are mining and petrochemicals, which have high energy and environmental footprints. Other sectors such as tourism or real estate depend on conducive environments to attract visitors and investors beyond tax incentives, for example, transparency, openness, long-term security, or residency rights. Some GCC states such as the UAE have had more success with diversification, with Dubai as a model for non-oil development in which most state revenues are collected through fees, especially from tourists and the large immigrant community. To attract more investors and visitors, countries such as the UAE and Bahrain have shown tolerance towards cultural diversity by allowing alcohol consumption, lifting restrictions on women, and facilitating non-Muslim sites of worship. Other GCC countries such as Saudi Arabia are eliminating red tape in order to make their economy more accessible for outside investors.

The road to diversification and development will not be easy, as various obstacles need to be overcome, some of which have been highlighted in the papers in this special issue. For example, the high level of subsidisation makes competition in some markets impossible. Furthermore, sound macro-economic policies, infrastructure, political stability, and technological innovation potential are important for attracting investment. The final outcomes of diversification are job creation for local populations, increasing their income and forming a prosperous society, and enhanced living standards.

Rentierism's spill-overs on sustainability

A visitor to the GCC region might rightly question any notion of sustainability after witnessing apparent waste such as water parks in the middle of the desert using groundwater, air-conditioned floors in open-air places, or excessive amounts of off-street lighting. One reason for such waste is that water and energy have for a long period not been priced according to real economic costs, and not even to the basic cost of production. High subsidisation of water and energy prices have had negative effects on water use in the Gulf region, one of the most water-deprived (in terms of per capita availability of renewable water resources) regions in the world due to its arid climate. GCC countries can only meet their water demands by heavy reliance on desalination processes, whereas groundwater has been the main source for irrigation, and most aquifers are severely depleted across the region (Pirani and Arafat 2016).

GCC citizens receive many benefits, including in products such as electricity, water, gasoline, gas, and food. Together with welfare and other benefits such as well-paid public jobs and property-buying

schemes for nationals, this system has constituted the social contract of rentier states. Rentierism is one reason behind the high per-capita rates of energy and water consumption as well as waste generation in the GCC. The heavy subsidisation of water by the governments has contributed to one of the highest per capita levels of water consumption worldwide, with average daily water consumption per capita between 200 and 600 litres (Al-Zubari et al. 2017). The accessibility of these basic amenities provided by GCC governments is not universal, as in some areas, for example Saudi Arabia and Oman, some households, particularly in rural areas, still depend on wells and tankers.

There are signs of reforms in the water and energy management sectors across the region. The water sector is witnessing the expansion of desalination and water reuse capacities, changes to cropping patterns in agriculture (e.g. prohibiting the cultivation of water-intensive forage such as alfalfa, widely grown in the GCC), awareness-raising programmes among the public, and changes to tariffs. With regard to energy, GCC countries have started to invest in alternative solutions such as renewable and nuclear energy, waste recycling, and wastewater reclamation. Importantly, energy subsidies have been significantly reformed in the last couple of years, although subsidy levels are still high internationally, while the rentier state mentality persists through new forms (e.g. the premise of stability and security, or public jobs in new industries such as mining or renewables) (Krane 2018).

Divergences, crossroads, and breaking points

GCC economies and societies have strong commonalities such as a common culture (being Arab Muslim and largely tribal people); a dependence on fossil fuel revenues; the integration of global markets through the export of energy resources and the import of technology, know-how and labour; a large public sector; and a small private sector driven by merchandise. However, there are some divergences in terms of sustainable development strategies, while some political and environmental catalysts of change can set the region's countries apart. Al-Saidi, Zaidan, and Hammad (2019) highlighted how Qatar and the UAE tend to stand out as energy-abundant and rich countries with strong global ambitions and a higher level of engagement with global environmental regimes. UAE has shown its eagerness to integrate into global networks and adopt state-of-the-art environmental paradigms. For example, the UAE hosts the headquarters of the International Renewable Energy Agency (IRENA) in Masdar city, a unique low-carbon mega-project that advocates the development of ecological innovations. It is also one of the few countries in the wider Arab region that has adopted comprehensive green-growth strategies, the main theme of the 2012 Rio plus 20 conference (the third Earth Summit). Such formal engagement with sustainable development ideas stands in contrast to climate-sceptic countries such as Saudi Arabia and Kuwait, which for a long time sought to obstruct progress on important issues such as combating climate change.

Qatar has also been engaged with the global agenda, especially the climate action talks prior to the 2014 fall in oil prices, for example, hosting the 2012 conference on climate talks. As a small and rich country as well as the only significant gas exporter in the region, Qatar has the potential to surpass the UAE in terms of energy-efficient buildings, renewables targets, and knowledge production. Mega-projects and mega-events are shaping the development landscapes in both Qatar and the UAE, with the UAE hosting World Expo 2020 and Qatar hosting the 2022 football World Cup. These events mean big investment in infrastructure and are catalysts of change, as they impose pressures to conform to the expectations of the global audience on infrastructure as well as environmental standards. Although the merits of mega-projects are criticised for hindering sound master-planning and being extravagant (Rizzo 2017), they form an integral part of the regional competition for symbolic dominance in terms of living standards and the nuances of the economic model; for example, Qatar as a Islamic, moderate but modern state, versus the UAE as a more westernised model. This competition can set the region at a crossroads, especially in light of the 2017 break-up of the economic relationship with Qatar initiated by the UAE, Saudi Arabia, and Bahrain. It is still too early to evaluate the consequences of this crisis on the future of development in the region, but it

certainly goes against the spirit of cooperation needed to commonly manage future environmental challenges, which could bring the economies of GCC countries close to dangerous breaking points.

There are many warning signs of the inability of GCC economies to change in a timely manner to cope with rising demands, particularly for countries such as Saudi Arabia where local energy demands might eat up all oil produced for exports as early as 2030 (Gately, Al-Yousef, and Al-Sheikh 2012). Furthermore, GCC countries might not yet be well prepared for external shocks such as those caused by a warming planet, resource scarceness, and economic uncertainties. They might also suffer from crises in a globalised world that is influenced heavily by strong regional economic players and shaped by a distinct vision that goes beyond the boundaries of localism and provincialism (two traits native to the GCC countries). For example, Dubai's debt crisis revealed how insufficient communication and consultation with investors, some not previously aware of the emirate's increasing debt problem, can prolong economic troubles. This incident raised questions among several observers regarding the transparency and sustainability of decisions in the region, which are needed in order not to hinder the flow of FDIs. Political stability, trust and a basic respect for property and human rights are also issues that figure in decisions of foreign investors. A recent example is the international outcry after the killing of the Saudi journalist Jamal Khashoggi. This event made investors question not only the authority of Mohammad bin Salman, the young Saudi crown prince, but also the feasibility of his seemingly transformative agenda, which started with ambitious economic diversification goals and a relaxation of religious rules, notably through an acknowledgement of some basic women's rights.

Sustainability lessons and future directions

Fostering transition and broadening the sustainability agenda

The environmental, economic, and social aspects of policymaking in the GCC region show the shift in strategies, for example, economic reforms of subsidies, awareness-raising programmes to curb high consumption footprints, incorporation of energy efficiency in buildings, increasing capacity for reuse and recycling, and deployment of renewables for electricity generation or desalination. The governments in the region have openly stated their concerns and goals regarding the environmental pillar of national development and have identified environmental issues as something that necessitate intervention using national development mechanisms. However, it is too early to characterise this emerging transition as comprehensive. The majority of measures have centred around technological and efficiency enhancements as well as ramping up capacity to produce environmental knowledge that can be marketable as a part of the economic diversification efforts of the region.

There are signs of this emerging transition to sustainability or ecological modernisation, but it cannot be directly linked to environmental pressures as the main motivator (Al-Saidi and Elagib 2018; Al-Saidi, Zaidan, and Hammad 2019). At the same time, some trends can potentially jeopardise this transition, such as developing energy-intensive industries, support for local agriculture without regulation of water use, and the prevalence of a culture of waste. The way to enhance resource securities in the region is to balance supply and demand measures in a sustainable management of resources. For example, local agriculture can be developed through sustainable options using technologies based on reuse and water efficiency. There has been criticism of the sustainability of the present strategy of the Gulf countries of long-term lease of agricultural lands, since food supplies can be vulnerable to politicisation and other supply-chain complications beyond the control of importers. However, GCC countries will need to keep securing some of their goods from outside, including food products. The challenge is to develop comprehensive national food-security strategies that select products for storage, import, and local production. Such national strategies are lacking not only for food security but also for other areas such as addressing climate change (see Al-Saidi, Mohammad, and Awartani 2018 for the case of Qatar). There are other sustainability issues that

need to be tackled as well, such as linking sustainability policies to population and migration, higher education, and health or lifestyles issues.

Cooperation and wide participation

Sustainable development is a societal responsibility that involves partnerships among many stakeholders, including the government, the private sector, and civil society groups. SDG17 refers to multi-stakeholder partnerships, global partnerships, and both domestic and transnational collaborations towards the effective implementation of a sustainability agenda.

GCC countries have some way to go in regard to effective cross-sectoral partnerships. Top-down strategies through government-led development models remain the predominant mode of work, academia is relatively isolated from local groups and the public, and the private sector's engagement in sustainable development could be improved. Effective partnerships with a common outlook are vital to ensuring coherent, economically viable, socially equitable, and environmentally acceptable policies, plans, and programmes (United Nations 2018). Moreover, to ensure a well-aligned vision across all stakeholders, tangible impacts, and "real" sustainability, many considerations must be taken into account from the outset. The first step, according to the Arab Forum for Environment and Development is "*a change in the mindset and culture*" towards an integrated participatory approach to policy-making geared towards sustainability and inclusion (Saab and Sadik 2016). Furthermore, as Sabbagh and Copeland (2019) conclude, local partners must be more actively involved in anchoring partnerships within their local contexts to ensure that they respond to local needs and are inclusive. Another role for civil society organisations is the "*dirty job*" of holding to account third-party stakeholders such as national government ministries and local authorities to ensure they uphold their commitments (Hayman 2019). They must continue to reflect on the impact and relevance of their work with local communities and maintain alignment of their interventions with the SDGs (Albakri and Shibly 2019). Doing so embeds a "sustainability mindset" from the outset of programme design and evaluation.

Finally, it is important to recognise that the most crucial partnership lies with the generations that will maintain and sustain all these efforts. To that end, capacity development and education efforts in local communities, schools, universities, and the general public around the sustainability discourse cannot be overlooked. There are various strategies to tackle bottom-up advocacy on sustainable practices, convincing people of its importance, and recognising individuals' responsibilities and roles regarding the Global Sustainability Agenda, rather than treating it as a distant concept. Examples include integrating messages within school curricula, investing in electives in universities across disciplines, examining the Islamic perspective on sustainability and encouraging further research and education around this, and engaging community leaders and influential personalities to advocate for sustainable development. Working from the bottom up will inevitably consolidate national efforts and translate policies into lived practices and bring anticipated results closer.

Investing in technology, research, and innovation

The GCC countries need to implement measures in order to encourage entrepreneurship and the development of local markets aligned with sustainable value creation. The region is still lagging behind on key indicators in this regard. For innovation and infrastructure, clusters with skilled labour as well as knowledge-production centres are important in order to grow the efficiency and output capacity of relevant technologies. GCC countries need to support these critical factors by investing in fundamental and applied science and advanced information technology infrastructure. There are some environmental technologies that can present comparative advantages for the region, such as the desalination and energy industries, due to the relatively large share of global production in this region. Furthermore, the use of renewables can be explored as a way of expanding local agriculture by using clean energy sources. However, as the contribution of Al-Saidi and Lahham (2019)

shows, the use of renewables in agriculture needs to be carefully designed and regulated so that it does not lead to an increase in the exploitation of non-renewable water resources. Some industries can be transformed through innovations to reflect efficiency and environmental friendliness. Projects are under way in this area include constructing solar desalination plants (such as the Al-Khafji plant in Saudi Arabia, the world's largest large-scale solar-powered desalination plant), and improving carbon capture and storage in the oil and gas industries (e.g. a Clean Development Mechanism project in Qatar in the Al-Shaheen oil field).

The innovation policies in the region need to foster the development of intellectual-property regulations, incentives for research and development, government procurement of sophisticated products, and openness to international trade and investment. In addition, these policies are usually linked to entrepreneurial measures in terms of training programmes, entrepreneur networks, availability of risk-capital providers, and the provision of entrepreneurship infrastructure (e.g. incubator facilities and different services for start-ups) as well as policies that cover bankruptcy laws and the ease of doing business. Currently, despite the substantial spending of GCC states on innovations and growth, the number of patents and new firms is limited, while the production of such knowledge and innovation still depends on the existence of policies to attract highly skilled foreign experts and scholars. There is no strong evidence of the transfer and assimilation of knowledge towards local populations, while the conducive environment for interactive learning between locals and expatriates is not well developed. To ensure a holistic analysis of sustainable development where social equity and economic sustainability are indivisible, a "*new research culture*" capable of addressing the interdisciplinary and trans-disciplinary character of sustainability research is needed (Leal Filho 2018). This must be solution-oriented and tailored to local contextual realities and needs, and locally grown to ensure relevance and applicability to local policy-development and decision-making processes, as well as engaging local communities in defining the research agenda as opposed to being mere targets.

Policy integration and sustainability engagement

Sustainable development is a holistic concept, which, for some scholars and practitioners, is even larger than the three pillars of economic efficiency, environmental sustainability, and social equity, coined in the late 1980s by the Brundtland Commission. Although most national development policies in the region reflect these overarching pillars, our understanding of this concept has been expanded over the decades and now incorporates multifaceted issues of governance, cultural aspects, peace, equality, efficient use, and clean development. A good (although not yet comprehensive) reflection of contemporary issues related to sustainable development is the global consensus on the SDGs. Here, issues range from basic development prerequisites such as income, education, and health to common environmental challenges of clean energy, biodiversity, sustainable agriculture, smart cities, water management, waste, and sustainable consumption. The SDGs are acknowledged and their achievements reported by GCC countries, but the countries' performances do not match their ambitions, nor the performance of regional peers and others from the developed world. According to the 2018 SDG Index, which measures the implementation of the SDGs, out of 156 countries, GCC countries rank as follows: 80th for Bahrain, 105th for Kuwait, 94th for Oman, 106th for Qatar, 98th for Saudi Arabia, and 60th for the United Arab Emirates. This is in comparison to 43rd for Singapore and 41st for Israel (Bertelsmann Stiftung and Sustainable Development Solutions Network 2018). Such a performance does not reflect the self-image nor the resources of the region. GCC countries have high income levels, good revenue streams, and a strong position in the global economy in terms of being energy suppliers as well as importers of technologies and labour. Furthermore, they hold powerful sovereign wealth funds, which they use to mitigate fiscal crises and invest abroad, mostly in developed countries. In the case of regional stability and cooperation, such funds can also be invested regionally, such as in beneficial agricultural investments in Sudan, now in a post-revolutionary and rebuilding phase, or in the transfer of know-how on desalination to other Arab countries.

There is a need to address sustainability issues across the board, from supply-side clean technologies to demand-side consumption patterns, urban to rural, and air to water and land. The engagement of GCC countries with the global sustainability agenda needs to move beyond participation through reporting and formal reference to local action (the current national visions) to this agenda. Effective engagement implies stronger modes of action through the development of actionable and integrated national strategies for key sustainability challenges (e.g. climate-change strategies, food-security plans, integrated water-management strategies and water laws, biodiversity-related strategies, risk-management and resilience strategies, laws on renewables, etc.).

Some of these challenges can only be addressed through regional coordination; such as risk management, the ecological status of the Gulf waters, or climate action. They also require that future policies and institutional arrangements are reflected to a larger degree with integration among issues. The region's experience with one-sided development policies has shown that one cannot isolate food security from groundwater considerations, desalination from its increasing energy footprint, urban planning from air pollution and warming impacts, or coastal development from its effects on marine life and the tourism sector. Policymakers in the region are increasingly aware of these interlinkages and of the need for specific national policies and regional cooperation frameworks. A crucial related point that needs to be considered to bolster these steps towards policy integration is the attention to the financing dimension required to enhance sustainable development. Although funding may not be the primary challenge for GCC countries compared to other Arab countries, the "greening" of these ample budgets and their redirection from conventional investments to sustainable ones that also take into account climate-change concerns is (Saab and Sadik 2018).

The ability to mitigate upcoming sustainability challenges and guide the region into a post-carbon future is dependent on (largely available) resources and integrated and concrete strategies, but it is also a function of political will and effective engagement with local stakeholders, neighbouring countries, regional partners, and the international community.

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Notes on contributors

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