CLIMATE CHANGE: ECONOMIC IMPACTS ON THE ARAB GULF COOPERATION COUNCIL

Saad Darwish, Kingdom University

ABSTRACT

Around the world, there exist many countries experiencing climate-related problems. For instance, member nations of the Gulf Cooperation Council (GCC) are susceptible to climate change-related outcomes because of the preexisting high temperatures witnessed in the region. The Gulf Cooperation region and the Arab world face multiple interlinked dilemmas embedded within economic, social, and environmentally sustainable development issues. The region is experiencing climate change and inherent poor environmental practices, threatening the environmental systems. Arabic countries possess the largest crude oil reserves worldwide, which complicates efforts to restrain the sectors considered sustainable economies as the action accelerates global warming. This paper will highlight the impact and help give decision-makers direct on the consequences and overcome them.

Keywords: Climate Change, Economic, Cooperation Council

INTRODUCTION

Most of the risks associated with climate change within the GCC region is the side effects of the sweepingly increasing temperatures. According to (Asi 2021), these temperatures pose substantial threats to the region by the end of the 21st century, whereby they may see the temperatures rising by 4 degrees. Global warming changes weather patterns, leading to extreme weather disasters like floods, snowstorms, and wildfires. Besides, high temperatures are not only uncomfortable but are also disruptive to most of life's aspects. For instance, heat waves are popular with causing power outages, partially because of excessive demand for electricity among the region's people that rely on air conditioners. Similar outages have been reported within the GCC region resulting in protests by some member states.

Economics experts estimate that the economy of the GCC region could reduce by 20 per cent by 2050 if the temperatures increase further by 2 degrees, compared to a case where temperatures remain at pre-industrial levels (Livemore, 2021). As a result, tackling the region's climate change may lead to negative short-lived economic impacts unless integrated with significant investments to develop a sustainable green energy sector. However, failure to do so may impart devastating long-term effects within the GCC region and globally (Livemore, 2021). Economic experts provide evidence for non-linear links between rising temperatures and economic growth. The evidence indicates the relationship to be positive, but only to the point where the mean temperature in a given state falls under 15°C, popularly known as the sweet spot of the region's temperature growth (Livemore, 2021). However, the relationship becomes negative as mean temperatures surpass the sweet spot. In turn, this means that as the globe continues to warm in years to come, countries within the GCC are expected to face the most significant dips in GDP growth (Livemore, 2021).

Countries within the GCC experience the highest water scarcity, water demand, and less supply and recharge, with the climate models predicting a hotter, less predictable, and drier climate (Al-Sarihi & Luomi, 2019). Speculatively, climate change will affect rainfall frequency, patterns,

Citation Information: Darwish, S. (2021). Climate change: Economic impacts on the Arab gulf cooperation council. *Journal of Management Information and Decision Sciences, 24*(S6), 1-10.

duration, and amounts leading to reduced rainfall reliability. In addition, this may cause increased floods, hurricanes, drought, and storms while unsettling the region's water balance, quality, and quality. Inherently, reduced rainfall coupled with higher temperatures will decline the rate of aquifer recharge, the flow of streams and rivers and progressively increase the sea levels, making the region arider (Parimalarenganayaki, 2021). This will reduce the region's biodiversity, significant impacts on infrastructure, water management, and agriculture, which are all elements that underlie the economic impacts of climate change.

Being a tremendously oil-dependent region, oil extraction contributes explicitly to the gross domestic product (GDP). As a result, the region's gross domestic product becomes vulnerable to peak oil and consequent reduction in oil demand, mainly because electric vehicles have become mainstream and other industries are turning their backs on fossil fuels. Most of the region's industries, such as chemicals, metal sectors, refining, and power production, have grown to take advantage of cheap access to gas and oil. For instance, even the tourism and travel sector within the GCC region heavily depends on tourists from far, with about fifty per cent of visits categorised as long haul, which is hugely oil intensive (Livemore, 2021). Besides, it appears likely that policies implemented to handle climate change effects like border carbon adjustments and carbon taxation will significantly impact the GC. The economic result is that the GCC economies are likely to become more progressive, with excellent investment levels within emergent sectors contrasted to most parts of the world. Such initiatives include the UAE Operation 300bn and Saudi Arabia's Vision 2030, among other reforms. They are geared towards attracting foreign talent and investments by creating the right business conditions for innovation to reinvent their dying economies (Livemore, 2021).

LITERATURE REVIEW

Challenges &Threats

GCC nations have several environmental challenges, including balancing economic diversification, water supply, food security, environmental preservation, and conservation in the face of the rising dangers of global warming. These nations have continued to play an increasingly important role in climate change; they are both producers and exporters and climate change, sufferers. As a result, they must have the full backing and support of the world community. There is no tolerance for unilateral activities that disregard other stakeholders. The Gulf region's conventional perspective on climate change, renewable energy, and traditional fossil fuel sources has shifted dramatically in the previous year. There is a trend toward energy diversification, with increased research and projects in renewable energy and a determination to combat climate change and play an essential part in the emissions trading market.

Water Security & Water Management

Water is considered an essential natural resource for sustaining the survival of almost every living organism. Natural resources are vital for domestic use, agriculture, tourism and culture, industrial input, and sustaining the global ecosystem (Odhiambo, 2017). The seasonal and regional variations greatly influence any nation's economy, development, and environment in the availability of quality and quantity ground and surface water. Recently, it has become apparent that human prospects and prosperity for survival depend on the distribution and quantity of fresh, unpolluted water. Similarly, researchers have reviewed the availability and scarcity of water within the Gulf

Citation Information: Darwish, S. (2021). Climate change: Economic impacts on the Arab gulf cooperation council. *Journal of Management Information and Decision Sciences, 24*(S6), 1-10.

Cooperation Council to assess the economic consequences of climate change and the inherent heavily subsidised water tariff (Odhiambo, 2017).

A significant characteristic of the earth's freshwater resource is the temporal and uneven distribution and variability dictated mainly by climate (Odhiambo, 2017), with conditions spanning from arid areas, with almost no rain, to more humid areas that can receive bountiful rain quantities within a year. As a result, the availability of water resources on a per-capita basis varies significantly among countries and regions. Within arid regions, the freshwater resources may sometimes become limited because water demand cannot be satisfied by merely going past sustainable use (El Gayar & Hamed, 2017). The climatic conditions determine the regions to receive adequate rainfall, influencing water availability. Within the Gulf Cooperation Council, ready availability and accessibility of freshwater have always been a critical concern (Odhiambo, 2017). The region is considered to have the worst per inhabitant and unlimited water resources. Over time, the region's water scarcity has affected the livelihoods and lives of its inhabitants. These inhabitants have developed tremendous varieties of changes to water-supply deficits and fluctuations. However, recently, high population growth expanded agricultural, and urbanisation activities and the inherent climate change has put substantial strains on the region's water resources (Odhiambo, 2017).

The issues of water scarcity within the GCC region are intensified by climate changes and variations that affect the hydrologic cycle of most countries. Most of these countries depend primarily on desalination, treated water, and groundwater. Most groundwater aquifers within the region are being exploited in an unplanned and uncontrolled manner either because they are non-8 or because it has not been practical to regulate their access (Parimalarenganayaki, 2021). Unplanned groundwater mining erodes the social and economic sustainability of communities dependent on depleting storage. As a result, countries like Saudi Arabia, the UAE, Kuwait, and Bahrain, have resorted to seawater desalination. (Darwish et al , 2018 ; Mohamed et al., 2017). If the water consumption continues at the current rate, the region may run out of water within the decade (Odhiambo, 2017). Therefore, the rapidly reducing water resources, precisely because of climate change, portend adverse economic implications for Yemen and the larger Gulf Cooperation Council region (Odhiambo, 2017).

The Gulf Cooperation Council and the larger Arabic region have an arid climate with an annual rainfall average of less than 200 mm, an extremely high evaporation rate, poor groundwater recharge rates, and no dependable, permanent surface water resources. This accounts for the severity of the region of water scarcity and the arid climate. The region is considered one of the most vulnerable to climate change effects, mainly because of its water scarcity, the highest globally (Odhiambo, 2017). Worse still, the area is projected to become hotter and drier with a less predictable climate and an inherent 20 per cent dip in rainfall, leading to a 20 to 30 per cent water runoff by 2050 (Odhiambo, 2017), on account of the rising temperatures and declining precipitation. For instance, Saudi Arabia is expected to experience a 15 to 20 mm decline in precipitation in its northern and western coastal regions near Tabuk during summer. In turn, the eastern and northern regions are expected to experience drought. Such climatic conditions involve increased water and soil salinity in the region's aquifers (Odhiambo, 2017).

Conversely, the significant challenges within the GCC, especially as they relate to climate change and water scarcity, involve water management. The unsustainable groundwater use impedes various ramifications on the region's economic development. For instance, the region experiences ever-rising urban water demands and has a heavy burden on the member countries' national budgets and negative environmental impacts (Odhiambo, 2017). Continued climate change will make water an increasingly rare commodity, and this would be a significant limiting factor for further economic development within the region in agricultural and industrial sectors (Odhiambo, 2017).

Citation Information: Darwish, S. (2021). Climate change: Economic impacts on the Arab gulf cooperation council. *Journal of Management Information and Decision Sciences, 24*(S6), 1-10.

Diversifying the Economy

Most of the oil-rich Gulf Cooperation Council member countries are focusing their efforts on diversifying their economies to shift from oil-based to the service sector, mainly due to the adverse climate changes witnessed thus far (Odhiambo, 2017). The tourism sector, for instance, is among those targeted by governments such as the UAE and Kuwait to design the region's engines of economic diversification and growth. However, the constantly rising demand for water enjoined with climate change effects increases the pressure exerted on the region's water resources, including many islands and coastal tourist attractions. Agreeably, various tourist activities like golf add to the overall water use (Odhiambo, 2017). The water consumption by golf courses varies greatly depending on the climate, soils, and golfs course size. Within dry climates like the ones dominating the GCC region, the water used to irate the golf courses is much higher because of the extremely high rate of evaporative water loss (Odhiambo, 2017). In addition, freshwater is needed to maintain the landscaping and gardens of attractions and hotels, embodied in the tourism infrastructure, fuel, and food production. These water-intensive activities linked with the hotel industry pose an even significant threat to the already limited water resources and impede the region's efforts to diversify their economies to mitigate climate change effects.

Climate projections indicate an increase in the intensity and frequency of extreme weather events. The rise in global temperatures, mainly caused by climate change, makes the heat stress phenomenon more common. Heat stress is the heat received by the body more than it can tolerate without undergoing physiological impairments (Kjellstrom et al., 2019). For instance, such excess heat increases various workers' occupational vulnerability and risks, leading to heatstroke and eventually even death. The expatriation of the urban heat islands, which are regions of concentrated heat within cities leading to increased urbanisation and population, will intensify the effects of the heatwaves, further aggravating the risks facing workers (Kjellstrom et al., 2019). Arguably, heat qualifies as an occupational health and safety hazard. Excessive heat during work instantiates occupational health hazards, which restricts the labourers' physical capabilities and functions, work productivity, and capacity (Kjellstrom et al., 2019). Temperatures over 24–26°C are linked with declined labour productivity. At approximately 33– 34°C, workers operating at modest work intensities lose about fifty per cent of their work capacity. Workers from all sectors are affected, with certain occupations facing higher risk since they encompass more physical efforts or occur outdoors. Such jobs include refusing collection, construction, emergency repair work, tourism and sports, transport, natural resource management, and agriculture, contributing to the GCC member countries' economies (Umar & Egbu, 2020).

Global Warming

Global warming is expected to expedite the heat stress levels even further. Researchers from the Massachusetts Institute of Technology (MIT) predict that conditions within the Gulf region such as extremely high temperatures, humidity, and intense sun and low elevations may make the region a regional hotbed where climate change is likely to adversely affect human habitability and sustainability in future if no significant mitigation is done (Migrant-Rights, 2019). Experts predict that increases in heat stress caused by global warming will cause losses in global productivity, equivalent to about 80 million full-time jobs by 2030 (MigrantRights, 2019). Within the Arab states, the construction industry will be hit worst, with heat stress expected to account for about 40 per cent loss of the total working hours by 2030. In the GCC, construction accounts for about 23 per cent of employment (Migrant-Rights, 2019). However, the high humidity and temperatures within the region coupled with outdoor work can proliferate heat-related issues for these labourers.???

Citation Information: Darwish, S. (2021). Climate change: Economic impacts on the Arab gulf cooperation council. *Journal of Management Information and Decision Sciences, 24*(S6), 1-10.

More so, migrant workers that account for approximately 95 per cent of the construction industry will be most affected—recorded previous heat stress-related losses, whereby 1.9 and 2.3 per cent of working hours were lost (Migrant-Rights, 2019). As a result, the GCC governments must initiate measures to protect migrants working under increasingly dangerous temperatures. Pollution and temperature levels must be monitored constantly to protect workers from heat and health risks (Yang, 2017). For instance, summer work bans should be based on absolute working temperatures rather than arbitrary calendar dates. The governments must ascertain that their workers can access appropriate dressing codes, health measures, and occupational safety standards and control their working environment to help workers adapt to heat stress. However, increasing inspection capacities is paramount to ensure proper enforcement of these regulations.

Land degradation is perhaps one of the significant long-term climate change effects caused by extreme weather conditions and poor land management. For instance, desertification is a form of land degradation that occurs when previously productive and fertile lands become deserts, limiting food production, prompting population migration, and raising water stress. However, the GCC region is primarily deserted; the region homes diverse forest lands essential for local economies (Asi, 2021). Foods such as olives, fruits and nuts, and non-food products like gums, cork, and aromatic plants do well in such regions. The vegetation is integral in enhancing land stabilisation and quality, limiting water stress, improving air quality, and controlling desertification (Albusaidi, 2019). However, these areas are also under significant stress, whereby most are categorised as either endangered or critical because of land degradation. More so, as humid areas continuously become more humid while dry areas become drier, heat waves and drought will expedite forest deterioration and increased forest fires (Asi, 2021).

Droughts are just a few of the extreme weather conditions caused by climate change's shift in weather dynamics caused by climate change. In a research study of the weather dangers within Arabic states, forest fires emerged as the most prevalent, followed by drought, flash floods, and storms like windstorms, electric, and sandstorms. Although floods are not the most common weather condition, evidence indicates them as the most catastrophic economic loss and human life, accounting for over $3 trillion in damages alone. Since the 1980s, such weather conditions have ended thousands of lives and damaged millions of croplands in hectares and tens of thousands of homesteads. Recently, Saudi Arabia has experienced a tremendous increase in the severity and quantity of flash floods in areas like Riyadh, the highly populated capital. The region depicts poor disaster management, with even wealthy countries failing to invest in appropriate mapping technologies and data to monitor geographic patterns and trends and impede economic losses (Asi, 2021).

IMPACT ON SECTORS

Agriculture and Food Security

Food security has long been subject to socio-economic and environmental pressures within the GCC. The region's food production systems affect the region's food production systems, prevalent arid conditions, erratic cropping trends, population growth, limited water resources, and insufficient technical knowledge. The overall agricultural system in the region encompasses rainfed agriculture. As a result, the annual food security and agricultural productivity are significantly correlated to the yearly precipitation variability. Climate change may increase precipitation variability and increase drought incidents (Al-Saidi & Saliba, 2019). Predicted climate changes may have adverse effects on the region's agricultural sector. The increased temperatures cause higher water needs for crops in summer. However, the Arab region is expected to increase water scarcity.

Citation Information: Darwish, S. (2021). Climate change: Economic impacts on the Arab gulf cooperation council. *Journal of Management Information and Decision Sciences, 24*(S6), 1-10.

Hence, the agricultural sector, which forms an integral part of its economy, may experience a fifty per cent decline in food production and security (Al-Saidi & Saliba, 2019).

Tourism

This is an important sector for most economies in countries within the Gulf Cooperation Council. However, akin to most sectors of the region's economic activities, it is vulnerable to climate change effects. The attractiveness offered by tourism destinations relies, to a great degree, on a region's climate. By utilising an index of several climatic factors, the tourism index measures the climatic comfort degree at a given site (Balli et al., 2020). However, with climate change, these climatic factors also change. The tourism comfort index will likely decrease in the GCC in the coming decades. The regions categorised as good, magnificent, and excellent will be less favourable by 2080 because of climate change (Mfarrej, 2019). Most of the estimated climate changes within the region will affect the attractiveness of its tourist destinations. For instance, droughts, extreme weather conditions, ecosystem degradation, and hotter summers are some of the expected effects (Mfarrej, 2019). Imperatively, future tourism efforts must consider anticipated changes via inclusive and integrated planning, like more explicit guidelines on the permitted distance between the shoreline and permanent structures (Ehigiamusoe, 2020). More so, options for more sustainable and alternative tourism that is less sensitive to climatic unpredictability, like cultural tourism, should be considered (Ehigiamusoe, 2020). Also, more desert and inland tourist destinations could be developed.

Transportation Infrastructure

The Gulf Cooperation Councils' economic landscape is further permeated by the territorial development and sustainability of the infrastructure sector like transport. Climate change is projected to impact infrastructure across the region significantly. Transportation infrastructure is vulnerable to estimated increases in frequency and intensity of hot days, sea-level rise, and storm activities. In coastal areas, infrastructure is especially vulnerable to possible storm surges and sea level rises, with the highest risks in the United Arab Emirates (UAE) and Bahrain. The reliability of established water supply systems will arguably be affected by higher mean temperatures and declining freshwater supplies. Also,

Wastewater Networks

Will become more vulnerable to sea level rises and extreme precipitation events. Energy generation will also be affected by higher temperatures that will reduce the capacity and efficiency of gas turbines and the thermal plants cooling efficiency (AL-SAIDI, 2019). Energy transmission and distribution systems will become more prone to failure because of the increased frequency of extreme weather conditions. As a result, the infrastructure should be reinforced to withstand harsh climatic conditions. Design operations and criteria are upgraded, considering new technologies and integrating the public's contribution to any decision-making process (Rissler & Shields, 2019).

Mitigation

Dominated by a fragile desert environment and an explicit high dependence on oil export revenues as the primary income source, the GCC economies are highly vulnerable to the accompanying climate change effects (Alharbi & Csala, 2021). As a result, this necessitates the

Citation Information: Darwish, S. (2021). Climate change: Economic impacts on the Arab gulf cooperation council. *Journal of Management Information and Decision Sciences, 24*(S6), 1-10.

reinforcement of non-oil economic industries since it renders the oil revenues vulnerable to the climate change effects and the mitigation measures adopted by the member countries. More so, dependence on oil makes the economic vulnerability to oil price shocks an unavoidable challenge to the area's economic stability (Ulrichsen, 2017). However, climate change, especially as evidenced by global warming, have immense impacts on the non-oil economic areas found in fragile desert environs (Al-Sarihi, 2018). The non-oil sectors include fisheries, infrastructure, tourism, and agriculture, and these may play an integral role in promoting economic diversification within the GCC member states with proper government interventions. Moreover, the projected decline in future demands for fossil fuels as exports because of global efforts to minimise greenhouse gases will adversely affect the region's economies, pushing them towards diversifying their economies (Lange, 2019). Conversely, addressing the climate change effects on the GCC countries may promote economic diversification by enhancing the sustainability of impacted sectors like tourism, fishing, and agriculture (Howarth et al., 2017). Alternatively, the region could promote investments in other energy resources, including low carbon technologies like energy efficiency, carbon capture, and renewable energy storage and utilisation.

Early recognition of climate change effects means that stakeholders and policymakers should consider the effectiveness of variant economic growth strategies to eradicate the potential effects and maximise economic benefits (Howarth et al., 2017). The strategies should increase society's ability to mitigate and adapt to climate change via different development options. The benefits of addressing GCC climate change problems and advancing economic diversification will likely surpass the costs incurred in addressing climate change effects in isolation from the region's long-term economic strategies (Albusaidi, 2019). Nonetheless, economic development policies are viewed separately from the effects of climate change.

Integrating mitigation and adaptation measures into the national life-long development strategies is essential to minimise the risk of conflicting strategies, extra regulatory burdens, and inefficient budget allocations. Rather than adding the GCC member countries' responses to the climate change effects as new policies, these should be mainstreamed into existing policy and decision-making processes (Howarth et al., 2017). Incorporating climate change actions into national economic strategies would help maintain the political will at every level since the climate change actions need to be implemented using inclusive stakeholder involvement across multiple actors (Howarth et al., 2017; Darwish, 2018). The multiple actors may include subnational, municipal, public, private, civil, and national society. In response to the adverse climate change effects, mitigation actions within the GCC countries may deliver emissions reductions, wider benefits concerning climate change development, adaptation, employment, public health, and energy security (Al-Sarihi, 2019). Adaptation may contribute to broad-ranging economic benefits, mainly promoting the adaptation of the non-oil sector. Considering the differences between the various Gulf nations, the primary areas targeted by the climate change adaptation within the region are water security, biodiversity protection, food security, infrastructure and urban planning, coastal areas management, agriculture, and marine and fisheries environments (Al-Sarihi, 2018). These sectors may, to different extents, contribute to low carbon economic development away from the reliance on fossil fuel revenues

RESEARCH METHODOLOGY

This descriptive methodology is used here to describe the current climate change scenario in the GCC States using secondary data and literature that examines the impact of climate change on GCC. To contribute, the researcher examined various sources to answer the researcher's queries. Given the descriptive nature of the study, an explanatory procedural approach is developed.

Citation Information: Darwish, S. (2021). Climate change: Economic impacts on the Arab gulf cooperation council. *Journal of Management Information and Decision Sciences, 24*(S6), 1-10.

According to this approach, researcher adopt and apply representativeness to the meaning of existing climate change knowledge through their thoughts. The approach is subject to analysing the current situation in the GCC states by identifying weaknesses and strengths and how this will aid in the development of future strategies and policies.

Research Problem

Review shows that several researchers have stated and concluded an urgent need to investigate this matter of climate change. Furthermore, with a faster growth rate, quick changes in economic systems, cultural transformation, and limited diversity of the economy and resources, governments must be aware and devise methods to identify vulnerabilities and strengths of strategies to deal with the consequences of climate change. As a result, the government's capacity to react and establish necessary plans is essential.

Research Statement

This prompted the researcher to dwell on the subject and respond to the following primary research question. "How far do government solutions to climate change concerns go?"

The Study's Importance and Goal

There is a critical necessity to develop strategies for confronting and dealing with climate change challenges and recognise their risks and dangers.

CONCLUSION

The main challenge for the Gulf Cooperation Council governments involves transforming their adaptation and mitigation aspirations into actions on the ground (Hossain, 2021). The appraisal of climate change effects on the economy of the Gulf countries reveals the importance of comprehending the distinctive interplay between the different countries' climate change and economies to inform a conception of national climate action strategies. The GCC states are affected by the adverse physical effects of climate change and the measures put in place in response to these effects. In an era of dropping oil prices and ballooning economic diversification processes, the region's climate change adaptation and mitigation ambitions could be successfully transformed into bountiful actions on the ground by addressing climate change problems underlying the emergent economic diversification strategies. However, most Arab states live in precarious conditions, whereby they are subsumed by the need to achieve short-term goals (Kasem, 2019). This limits their capability to engage in meaningful efforts to fight climate change or adapt to more sustainable infrastructure. Conclusively, governments need to prioritise repositioning their societies to reduce the avoidable results of climate change and protect them against inevitable economic changes. Despite economic diversification measures not being new among the GCC member countries, the lack of attention to climate change initiatives and the inherent mainstreaming of climate initiatives into diversification measures can be explained by the fact that the Paris Agreement came into life after the GCC launch of the long-term economic development initiatives (Griffiths, 2017). As a result, climate change actions must be established within the GCC region. However, this does not indicate climate change to be viewed as unimportant. Different GCC states have already implemented various climate-related initiatives and efforts. For instance, the United Arab Emirates' INDC (Intended Nationally Determined Contributions) was prepared to match its Vision 2021 to

Citation Information: Darwish, S. (2021). Climate change: Economic impacts on the Arab gulf cooperation council. *Journal of Management Information and Decision Sciences, 24*(S6), 1-10.

increase the utilisation of clean energy to 24% by 2021. In addition, the Gulf States indicate a progressive interest in creating emission reduction actions. Different targets for renewable energy and energy efficiency have been set for 2030, along with long-term objectives for 2050 and 2040 (Al-Sarihi et al., 2018; Darwish et al.,2018). However, only specific targets are compulsory such as the United Arab Emirates compulsory efficiency star rating and labelling for domestic appliances and Bahrain's adoption of energy-efficiency regulatory standards for electrical appliances and buildings (Al-Sarihi, 2018).

REFERENCES

Albusaidi, J. (2019*). Integrating air quality and climate change strategies in Oman* (Doctoral dissertation, University of York).

Alharbi, F.R., & Csala, D. (2021). Gulf Cooperation council countries' climate change mitigation challenges and exploration of solar and wind energy resource potential.*Applied Sciences*, *11*(6), 2648.

AL-Saidi, M.O.H.A.M.M.A.D. (2019). Coastal development and climate risk reduction in the Persian/Arabian Gulf. Climate change and ocean governance. *Politics and Policy for Threatened Seas*, *60*.

Al-Saidi, M., & Saliba, S. (2019). A risk perspective is water, energy and food supply security in the Gulf Cooperation Council (GCC) countries. *Water*, *11*(3), 455.

Al-Sarihi, A. (2018). Prospects for climate change integration into GCC economic diversification strategies.

Al-Sarihi, A., Almajdoub, S., & Al-Sulayman, F. (2018). Economic inclusion and sustainable growth: new perspectives from the Gulf.

Al-Sarihi, A. (2018). Integrating climate change policies with economic diversification strategies: challenges and opportunities in Oman and the UAE.

Al-Sarihi, A. (2019). Climate change and economic diversification in Saudi Arabia: Integrity, challenges, and opportunities. *Policy Paper*, *1*, 11-12.

Al-Sarihi, A., & Luomi, M. (2019). Climate change governance and cooperation in the Arab region. *Emirates diplomatic academy. EDA Insight: Research & analysis*.

Asi, Y.M. (2021) Climate change in the Arab World: An existential threat in an unstable region. *Arab Center Washington DC*.

Balli, F., Ghassan, H.B., & Al Jeefri, E.H. (2020). Towards understanding GCC outbound international tourism. *Journal of Policy Research in Tourism, Leisure and Events*, *12*(2), 142-151.

Darwish, S. (2018). Risk Management and Insurance Practices in Protecting the GCC Economies: Impact of Climate Change. *European Scientific Journal, ESJ*, *14*(13), 165.

Darwish, S., Abdo, H., & AlShuwaiee (2018) Opportunities, challenges and risks of transition into renewable energy: the case of the Arab Gulf Cooperation Council, *Journal International Energy Journal, 18*(4), 1-8.

Darwish, S., & Zubari, W. (2020) Strategic Risk Management (SRM): The Future of Desalination in the Gulf Cooperation Council (GCC), *Academy of Strategic Management Journal*, *19*(2), 2020.

Ehigiamusoe, K.U. (2020). Tourism, growth, and environment: Analysis of non-linear and moderating effects. *Journal of Sustainable Tourism*, *28*(8), 1174-1192.

El Gayar, A., & Hamed, Y. (2017, November). Climate change and water resources management in Arab countries. *In Euro-Mediterranean Conference for Environmental Integration*, 89-91. Springer, Cham.

Griffiths, S. (2017). Renewable energy policy trends and recommendations for GCC countries. *Energy Transitions*, *1*(1), 1-15.

Hossain, F. (2021). Adaptation measures (AMs) and mitigation policies (MPs) to climate change and sustainable blue economy. A global perspective. *Journal of Water and Climate Change*, *12*(5), 1344-1369.

Howarth, N., Galeotti, M., Lanza, A., & Dubey, K. (2017). Economic development and energy consumption in the GCC: an international sectoral analysis. *Energy Transitions*, *1*(2), 1-19.

Kasem, A. (2019). Exploring the impact of renewable energy on climate change in the GCC countries. 670216917. *Bits.*

Kjellstrom, T., Maître, N., Saget, C., Otto, M., & Karimova, T. (2019). I am working on a warmer planet: The impact of heat stress on labour productivity and decent work. Geneva. *International Labor Organization*.

Lange, M.A. (2019). Impacts of climate change on the Eastern Mediterranean and the Middle East and North Africa region and the water-energy nexus. *Atmosphere*, *10*(8), 455.

Livemore, S. (2021). The GCC region confronts the climate change difficulty. *Arabian Business*.

Migrant-Rights. (2019). Summer outdoor work bans end across the GCC, but heat stress continues. *Migrant-Rights*.

Mfarrej, M. F. B. (2019). Climate change patterns in the UAE: A qualitative research and review. *Nature Environment and Pollution Technology*, *18*(1), 261-268.

Citation Information: Darwish, S. (2021). Climate change: Economic impacts on the Arab gulf cooperation council. *Journal of Management Information and Decision Sciences, 24*(S6), 1-10.

Mohamed, H., Elayah, M., & Schuplen, L. (2017). Yemen between the impact of the climate change and the ongoing Saudi-Yemen war: A real tragedy. Centre for International Development Issues, Nijmegen. *The Netherlands*.

Odhiambo, G. O. (2017). Water scarcity in the Arabian Peninsula and socio-economic implications. *Applied Water Science*, *7*(5), 2479-2492. 1

Parimalarenganayaki, S. (2021). Managed aquifer recharge in the Gulf countries: a review and selection criteria. *Arabian Journal for Science and Engineering*, *46*(1), 1-15.

Rissler, G.E., & Shields, P.M. (2019). Positive peace—A necessary touchstone for public administration. *Administrative Theory & Praxis*, *41*(1), 60-78.

Ulrichsen, K.C. (2017). Post-rentier economic challenges. *India Quarterly, 73*(2), 210-226.

Umar, T., & Egbu, C. (2020, March). Heat stress, a hidden cause of accidents in construction. *In Proceedings of the Institution of Civil Engineers–Municipal Engineer*. *173*(1), 49-60. Thomas Telford Ltd.

Yang, Y. (2017). Heat stress intervention research in construction: gaps and recommendations.Industrial health, *Ind Health*. *55*(3), 201-209.

Citation Information: Darwish, S. (2021). Climate change: Economic impacts on the Arab gulf cooperation council. *Journal of Management Information and Decision Sciences, 24*(S6), 1-10.