

Concomitant of Global Warming and Land Reclamation: Designing a new interface between human kind and sea

Islam Hamdi El-Ghonaimy, Urban Consultant

Department of Architecture and Interior Design
College of Engineering - University of Bahrain
Isa Town, Bahrain
eelghonaimy@uob.edu.bh

Needa Javed, Researcher

Research assistant Department of Architecture and Interior Design
College of Engineering - University of Bahrain
needajaved05@gmail.com

Abstract

The Kingdom of Bahrain, as many other countries suffers from land scarcity, caused by the overpopulation. This directed them to substitute city designing, based on fundamentals of sustainability. Unfortunately, Government had only one quick solution to accommodate the swift urbanization and that was land reclamation upon the surrounding Gulf water. However, buildings off the Seashore as floated or within the sea with platform foundation are other solutions for the arising problem. Consequently, it will save the marine life and prevent the reclamation of land by constructing sustainable and affordable vertical buildings that will have large number of civic activities rather than reclaimed ones. No doubt, that constructing such buildings will consider many issues. For instance, social issues and needs in term of physiological adaption of new habitat i.e. water and sensitively in walkability and living offshore beside safety and privacy, while engineering subjects in term of technical services, structure system that face the hazards of earthquakes and fire protection. Finally, the environmental consideration in term of preserving fauna, flora, sewer (gray and black water) treatments, and recycling. This research paper covers the proposition of the Water city that briefly examines the theoretical roots of the proposal.

Keywords

Underwater – global warming – land reclamation – environment – climatic change

1. Research Philosophy and Inspiration

Water, the crux of existence, figure of clarity, freshness, beauty and nativity, it narrates emotions of calmness and peace. Architects have used water as a design element during antiquity, by nature it is utilized both as material and as spiritual entity. Human is amalgam of mind, body and soul, just as body nourishes with food, soul and mind nourishes with peace. The urban fabric is deduced from modernization with tall structures and auto mobilization. Human being is surrounded by layers of rigid concrete and as a refuge to our psyche natural elements of which water is one should be incorporated into the domain (Salimi, et. al., 2016).

The approach for proposing such research idea comes from an integration of the people connection with water and the history of Bahrain. It focuses on the phenomenological approach that mainly deals with the essence of human experience of the space and place provided with a unique experiencing phenomenon by combining the art, form, textures, function, psychology, visual impact, engineering services and time. Tadao Ando's design approach depicts the manipulation of natural sources such as water, light, wind giving a poetic essence along with an unforgettable sensory experience (Hsu, et. Al., 2015). Heidegger's Hermeneutic Phenomenology, focuses on the natural experience that unavoidably occurs by simply existing in the world., "*People understand new things through the prism of what they know*" this quote by Heidegger's reflects the idea being used in the project of making people experience a new yet natural space that is inside out.

1.1. Research Problem

Unfortunately, the world confronts challenges such as of rapid urbanization and climate change, also the after effects of both of these issues along with the impacts of land reclamation or creation of artificial islands on the environments as well as the communities. Due to a lot of land reclamation throughout the world and specifically in Bahrain and less coastal areas to be built around along with the threat of sea level rise, there exists a need for impregnable and sustainable built environment for humans.

1.2. Hypothesis

This Research paper discuss an alternative for land reclamation with constructing in the water that could reduce the environmental effects due to land reclamation to minimum about 90% of reclamation is being carried out currently in Bahrain that causes major impacts on the marine & ecological life along with the declining of Bahrain's fishing industry. Bahrain being an island always had a very strong and prominent connection with its sea, but with the passage of time and modernization the island lost it trait.

1.3. Aim and Objectives

The main objective behind this research is to accommodate all the human needs and facilities in a new environment i.e. water along with minimizing the effects that land reclamation has on marine and ecological life. In addition to this, the research will also shield against the threats induced due to global warming and sea level rise. It will cover the economic vision of Bahrain 2030 including (1) The broadening of the middle class of Bahrainis lifestyle, (2) focusing sustainability and (3) attracting private sector. The research will attempt to resolve concomitant of global warming and land reclamation through presenting the idea of new interface between human and sea in Bahrain in sustainable way, which could be achieved in:

- socially- via connecting people,
- economically via reducing expenses of land reclamation and attraction of the private sectors and tourism,
- Environmentally via technical solutions and preserving the marine life and elimination pollution due to land reclamation. The research will be helpful on regional and local level in term of (Figure 1):

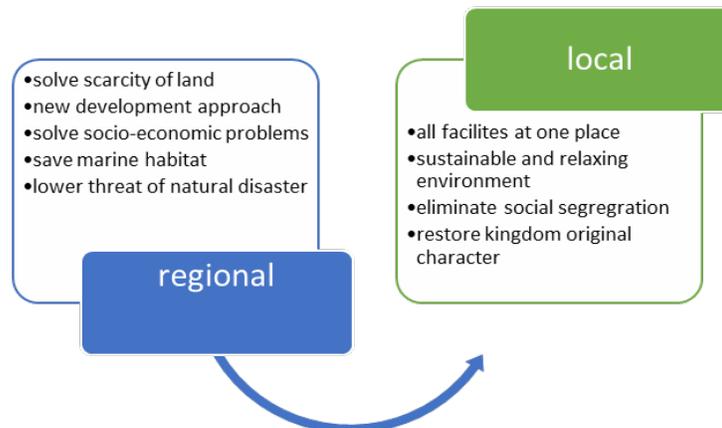


Figure 1. Benefits of research idea on regional and local level (By researchers)

1.4 Research Methodology

a. Theoretical Phase

Data Collection from different sources such as books, authentic resources, journals, thesis, websites that are related to the research problem.

b. Analytical Phase

Analysis of different comparable projects (analyzing case studies) and inspiration from the existing or proposed ideas.

c. Findings

The first two phases will lead in the formation of guidelines for preparing design issues, environmental solutions and new methods of construction and technical solution.

2. Hypothetical Background

“In order to understand the affirmatives and negatives of land reclamation a theoretical background for the same was analysed. Human beings along with land and infrastructure had a very long relationship with water and by nature, most of the population prefer to accommodate near the coastal areas because of the facilities and opportunities that it provides. Nevertheless, because of the climatic changes around the world, the coastal areas are vulnerable to many major threats and disaster and a practicing solution that mankind has adapted to deal with their own created problem is the land reclamation. Many researchers consider this procedure as beneficial, for instance it is referred as "gift from the sea" in china, it was widely used by countries such as Singapore, Hong Kong, Japan, Egypt, Dubai and Bahrain for boosting their economy and providing land for irrigation and growing population. Now a day's along with these factors land reclamation is being used by countries for defences against the natural disaster caused by climatic change. Many have conducted researches on the creation of the artificial islands. Some of them solely focused on the environmental impacts of it. For example, Butler (2005) wrote in an article “The Price of the World: Dubai’s Artificial Future”, that the artificial islands created in Dubai are resulting in the creation of water that is filled with silt. Moreover, the increase in the sediment particles have choked the reef and disturbed the natural water currents. In response to his article, the environmental scientist from Dubai said that the artificial islands offer more protection and has even enhanced the fauna of the sea. In addition to that, they have also recorded the presence of diverse marine organisms. Salahuddin (2006) Says that the construction of such islands have buried and suffocated wildlife, increased turbidity and changed the alongshore sediment transport. However, these researches solely focus on the environmental aspects of these islands.

Moreover, the reclamation of land has been elevated to a very high level and has become a mark of development of a country. This is due to the obvious influence of the artificial islands of the Middle East. In the Middle East, they represent the powerful societal forces and the possession of urban spaces for elite interest. The creation of such islands reduces the potentials for an urban public space and limits the horizon for the development of more socially just future cities. In addition to that, these reclaimed lands create privatization, exclusion and hyper-inequality in the society. Most of these islands are designed as residential spaces or holiday spots. They are admitted to people on the basis of wealth. Each aspect of the island is designed to serve the elites and to segregate their services and spaces from the normal citizens (Grydehøj, 2015). Land reclamation in GCC was first carried out by Dubai and this trend then spread in the entire gulf, Artificial or man-made islands are the places that are created by people to meet certain needs or desires. They are artificially created and do not exist before in the nature. It is not a new phenomenon but has been practiced since ancient times.... Many examples such as The Palm Jumeraih in Dubai, Amwaj Island in Bahrain etc.” (Javed, 2017).

3. Global Warming and Sea Level Rise in Different Regions

3.1 Effects of Global Warming and Climate Change

In general, the effects of global warming and climate change can be schematically represented as follows (Figure 2).

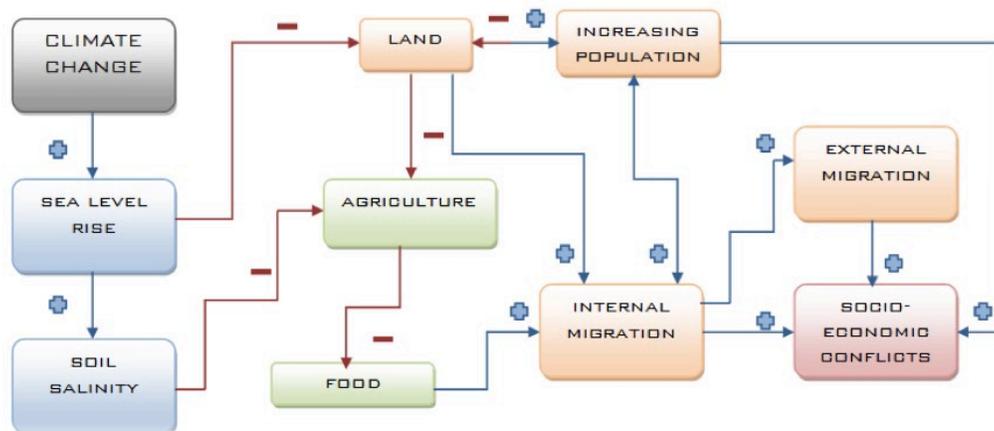


Figure 2. Consequence of climatic change (Javed, 2017)

3.2 Effects of Global Warming and Climate Change

“Here is how Global warming is directly related to a rise in Sea level. Human activities i.e. Carbon emissions caused by careless industrialization and pollution caused by combustible engines are the main contributors in increasing Earth's temperature as CO₂ is a greenhouse gas which is then trapped by earth's atmosphere that rises the temperature of earth causing the melting of ice-caps and glaciers which in turn give arise to the sea-level.

The major considerable reason for climatic change in the world is haphazard Human Activities (carbon emissions) gets trapped in the Earth's atmosphere specially with the urban encroachments upon agriculture lands and the loosing of green cover for earth which regularly control the CO₂ percentage in Earth” (Figure 3) (Javed, 2017).

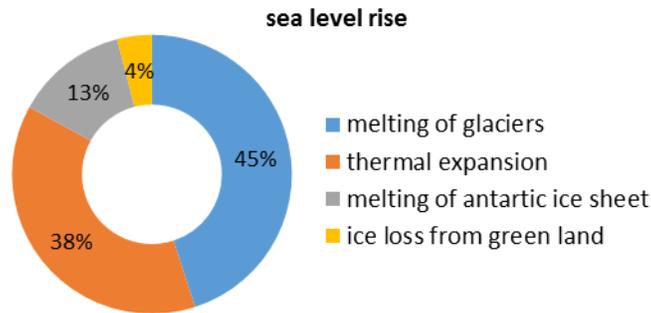


Figure 3. Factors of sea level rise (Javed, 2017)

3.3 Impacts of the Rise of Temperature of Earth upon Sea Levels and Countries' Land

“The rise in the temperature of earth causes the Ice caps to melt. (In-land + sea Ice). While the Sea-ice is not a contributing factor in SLR, In-land Ice-caps and their melting is a direct contributor to Sea-level rise. According to an estimate for every 0.3 meters rise in sea-level above 90 meters of cultivable land will be reclaimed by the sea. Figure (4) shows the effect 10m sea level rise would have upon different nations in the world.” (Javed, 2017)

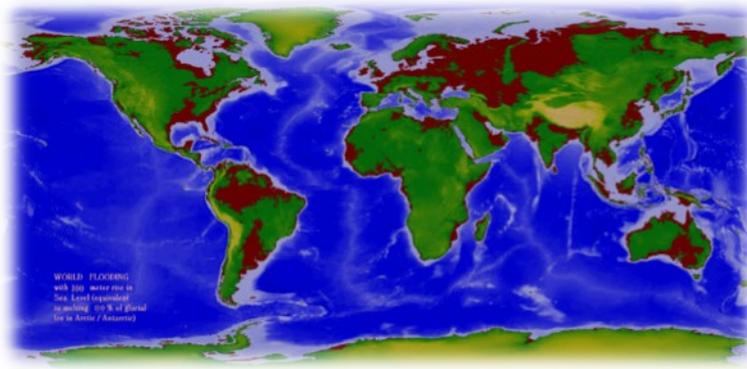


Figure 4. World map with sea level rise effects (google, n.d.)

“For instance:

- i. **Asia:** Bangladesh and Indonesia are estimated to be the most severely affected countries in the continent of Asia. With lives of millions at stake.
- ii. **Europe:** Italy, UK, Turkey are expected to be the most affected by the climate changes.
- iii. **North and South America:** San Francisco, Florida, Miami, San Diego, New Orleans, New York are already being facing the effects of climate changes in form of m/stronger earthquakes, tsunamis and floods.
- iv. **Australia:** Gold coast is mostly affected by floods that are cause by unequal sea level rise.
- v. **Africa:** Lagos, Mogadishu, Tunis, Monrovia, Mombasa, is the most vulnerable to the threats of global warming (Javed, 2017).

Figure (5) shows the over population in different continents from which it is very prominent that Asia to which Bahrain is a part of has the most alarming increase in the population. The cites are facing many challenges due to massive population movement into the urban areas, in order to deal with this rapidly growing population the

countries initially started building vertical but a time came when land started getting insufficient. Therefore, the man started reclamation of land in other words created artificial islands - The process of creating artificial islands or reclaiming land is becoming a popular trend all over the world. They may tend to symbolize the modernization or the development of a country. However, they might or might not represent the country in which they exist.

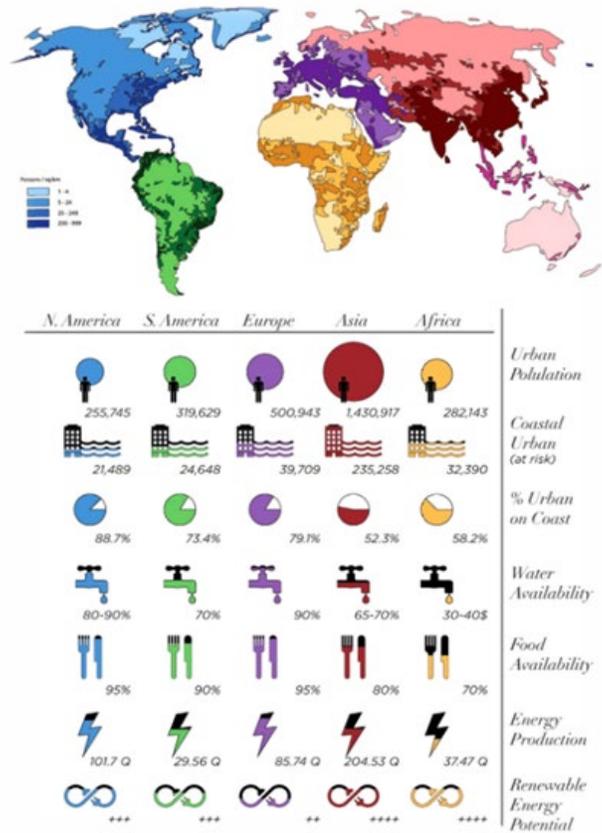


Figure 5. Dense population map (Britton, 2013)

It is well known that the glamorous islands of Middle East present a very modern and western lifestyle to its visitors. Despite the fact that this lifestyle contradicts with the culture and traditions of their respective countries. Moreover, this recent and major change in the society has affected the local citizens as well. These artificial islands have not only created an impact on the society but have also modified the sea ecosystem. Although now underwater construction of buildings and structures is considered as, a fantasy but it will be a need in the future.

4. Application of having Interface between Human Kind and Sea in Bahrain

4.1 Why Artificial Islands to Solve Land Scarcity in Bahrain?

Major reasons to think about creating artificial island and move to water were due to the major urban land problem in Bahrain, which are:

a) Shortage of Urban Land

Bahrain has developed horizontally with a limitation of land with area of 765.3 square kilometers last year, up from 759 square kilometers in 2010. (295.5 sqm) in size, making it the third-smallest nation in Asia after the Maldives and Singapore, The area of Bahrain was 741.1 square kilometers before expanding to top 757.9 square kilometers in 2009. The overall area of Bahrain averages 8,267 square kilometers, – including its territorial borders. US Geoeye imaging Satellite at 41-centimeter resolution has measured the new area of Bahrain. Green belts were around cities areas but because of the negligence and growth of population, it disappeared. This information is important to follow the physical changes and to provide competent authorities with important information, and that the increase is

considered normal, especially since the Kingdom is witnessing a boom as a result of urban development and increasing housing projects. In conclusion, 2016 added the most land over last year, amounting to about 6.3 Km concentrated in the northern part of the Kingdom (Al-Haidan, 2015).

b) Cities Became “Heat Island”

However, this phenomenon is around the world. In the year of 2050 it is expected that the world’s population will increase in double as well as seventy percent of the people will be living in cities. Losing agriculture lands due to urban encroachments is hazard and deteriorate the quality of life in addition to reduce the resistance and controlling the CO in the air. Moreover, cities became “Heat Island” with its concrete forests that increase the global warming phenomena as well. The infrastructure of cities will need to be able to accommodate and sustain the massive growth. The enormous growth requires wise actions and balancing the social, economic and environmental matters. Cities vary differently, one might be successful and the other suffers from poverty and inequality. These matters bring sustainable urban growth into the picture, however it is needed to invest in sustainable infrastructures and have a long-term vision as the results take time, so we will be ready in the future (Sapru, 2012).

c) Land Reclamation and the Social life

Various studies were performed to analyse the impact of the reclaimed lands on the society itself. Reclamation of land has been practiced worldwide and was created to either serve the demands of growing population or to provide land for irrigation and industries to boost the economy. In China, it is referred as a “gift from the sea” (Shepard, 2015) the impacts of these islands in Egyptian society shows that these islands were mainly inhabited in hope for a better life. Yet, the settlers faced various challenges of lacking a sense of belonging due to lack of services and infrastructure, for instance absence of secondary schooling, which resulted the families to split. People felt a sense of being abandoned by the Government. Although, there were few who enjoyed living in the reclaimed land and believed to have established stronger connections with the community. For instance, women who were bound by the rules and social norms of the village were able to negotiate those principles and participate in shaping the society. They had more freedom and were away from the social control of their families (Adriansen, 2009) (Figure 6).

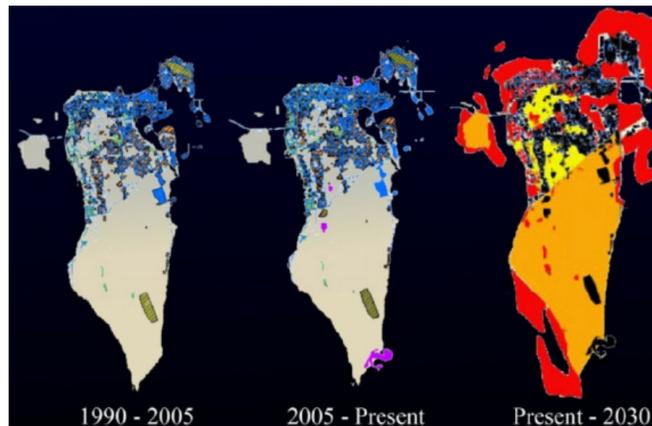


Figure 6: Timeline of land reclamation in Bahrain (Coastal development and land reclamation, Bahrain, 2018)

- 1990- 2005: the density of population was in the northern part near the sea or where agricultural fields were located
- 2005- present: urbanization resulted in over population of northern areas of Manama and Muharraq (D. Survey, 2009)
- Present- 2030: new islands proposed to provide facilities for the growing population

d) Land Reclamation and Planning

The process of reclamation has influenced the urban development of Bahrain (Figure 6). The publicly accessed seashores are replaced by real-estate market sea front, which considered the main player in reclamation in Bahrain. In addition, an organizer of reclaim initiative compares the conditions of Bahrain before the reclamation processes and explains how the country evolved after it. He describes that the whole communities were planned on the nature of the sea (Figure 7).



Figure 7. Major Artificial Islands in Bahrain (CFB, 2015) by real-estate and investors

The towns were located close to the sea and the streets and the houses were designed to capture sea breezes. This gave birth to the distinctive architecture of Bahrain. However, due to the reclamation of lands the communities were almost completely separated from the sea. He believes that sea has been disregarded to such an extent that it merely serves as a view from a point of private land. The change in the economy after reclamation is explained by Arora in “Impact of coastal development on marine ecology”. He says that Bahrain possessed shallow coastal areas, which housed ecological productivity. Although these shallow coasts are the prime target for reclamation of land as they are less costly, this has led to the forever loss of various forms of species. As a result of which the fishermen were deprived of their livelihood and it slowly erased traditional customs and culture. By real-estate and investors, smaller developments have also been built in the financial area of Manama, the capital, and include Bahrain Bay, Reef Island, and the Bahrain Financial Harbour. A development located in Bahrain's southern tip, Durrat Al Bahrain, is also approaching completion and consists of six atolls and five pearl-shaped islands spread over twenty-one square kilometres. A recent study using topographical and aerial photographs found that Bahrain's second-largest island of Muharraq had quadrupled in size since 1950, with the majority of new land having been reclaimed during the past fifteen years as shown in (Figure 8) (Fakhro, 2013).

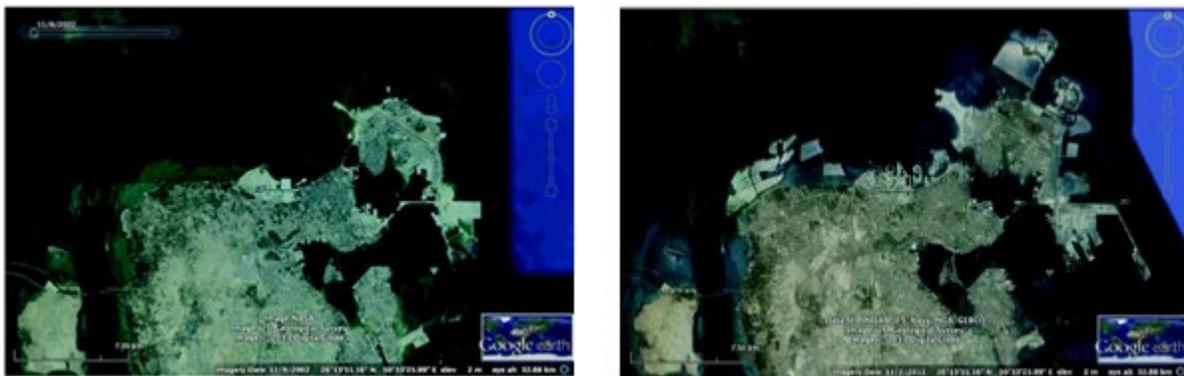


Figure 8. The Increased Land Of Muharraq (Fakhro, 2013)

As well as 90 percent of reclamation is currently going on in Bahrain (Toumi, 2010). The strategy for future land reclamation in Bahrain according of Bahrain vision of 2030 has the four proposed islands that will be built in order to increase land that would serve increasing the housing sector and Bahrain bays. The total area that would be achieved after adding these four artificial islands is approximately 21,000 ha.

e) Land Reclamation and the Environment:

In Bahrain, the government started to reclaim land due to the scarcity of land because of the overpopulation; having artificial lands. This is costing the government high expenses, but still it did not solve the problem as the population is increasing rapidly. Mohamed Khaled a member of Bahrain’s Parliament has said, “That land reclamation work had increased by 90 per cent from 2002 to 2007.” Land reclamation caused harm to the marine life. Bahrain has announced seasons for fishing, as the marine life have become poor due to the reclamation of land. Factories around the city with the lack of greenery caused air pollution (Toumi, 2017)

With such cases of Island urban problems, architects around the world looked to proposing many solutions to overcome the need for sufficient urban lands that enough for urban developing. This wave resulted from the lessons learned after the failure of tower blocks after the war period. Architects focuses on creating a suitable environment for the occupants of the building. Though developers of large-scale reclamation projects have assured their consent with international environmental practices, the effects of land reclamation on Bahrain's waters have nevertheless raised widespread concerns among environmental researchers and scientists. A survey of data from ten projects on reclaimed land in Bahrain found that 153 square kilometers of shallow marine habitat had been lost through dredging and filling of coastal areas. The study also found that dredging, combined with temperature stress, has caused the demise of Fasht A'dham, one of the largest reefs in the Gulf. Where this reef once extended from Eastern Bahrain into The waters of Qatar, today it consists of dead coral skeletons covered with sediment and algae; there is almost no living coral.

A study commissioned by the United Nations Development Program on Bahrain's biodiversity trends also found that 80% of Bahrain's original coastline had been modified through reclamation activity, which had caused a major reduction in intertidal habitats. Other environmental researchers found that wildlife hotspots, such as Tubli Bay, had shrunk by 60% between 1950 and 2006. In addition to these, the fishing industry of Bahrain has been adversely negative effected by the reclamation of land. According to a study, the fishing industry has faced 80% of collapse in fish stocks in the past decade also. The UN Food and Agriculture Organization has warned recently that extensive land reclamation, dredging, and destruction of reef areas have had a significant impact on fish stocks in Bahrain (Fakhro, 2013).

f) Controlling Land Reclamation with the Bahrain Approved Masterplan for 14-km Waterfront Project

Bahrain's Higher Urban Planning Committee has approved the conceptual masterplan for a large-scale waterfront development project stretching from the King Faisal Corniche in Manama to Muharraq. The masterplan includes a detailed proposal to develop a 14-km section of waterfront between Juffair and the King Faisal Corniche, a Bahrain News Agency (BNA) report said. The new waterfront development concept features a wide range of facilities for citizens and residents, including public beaches, walkways, green spaces, and restaurants, as well as cycling and running facilities, the report said. The project represents the latest example of the vital role played by the Higher Urban Planning Committee in delivering sustainable urban development and expanding public facilities to meet citizens' aspirations, in line with HM King Hamad's vision, said the report. The Higher Urban Planning Committee has prioritized the waterfront masterplan as an important opportunity to integrate Bahrain's natural environment within modern, high quality development, it said. The committee is chaired by HRH Prince Salman bin Hamad Al Khalifa, the Crown Prince, Deputy Supreme Commander and First Deputy Prime Minister to prove the importance of the project (Figure 9) (BNA, 2018).



Figure 9: Controlling land reclamation with the Bahrain approved masterplan for 14-km waterfront project (BNA, 2018).

4.2 Design Philosophy

The idea is to shift the objective i.e. Towers and podium style of buildings to something existing in nature, integrating with the urban and natural context. The approach for designing the new interface between people and sea via proposing offshore platform. This platform includes buildings comes from an integration of the people and their needs in some activates. This artificial island encourages users' connection with sea and the history of Bahrain. It focuses on the phenomenological approach that mainly deals with the essence of human experience of the space and

place provided with a unique experiencing phenomenon by combining the art, form, textures, function, psychology, visual impact, engineering services and time (Figure 10).

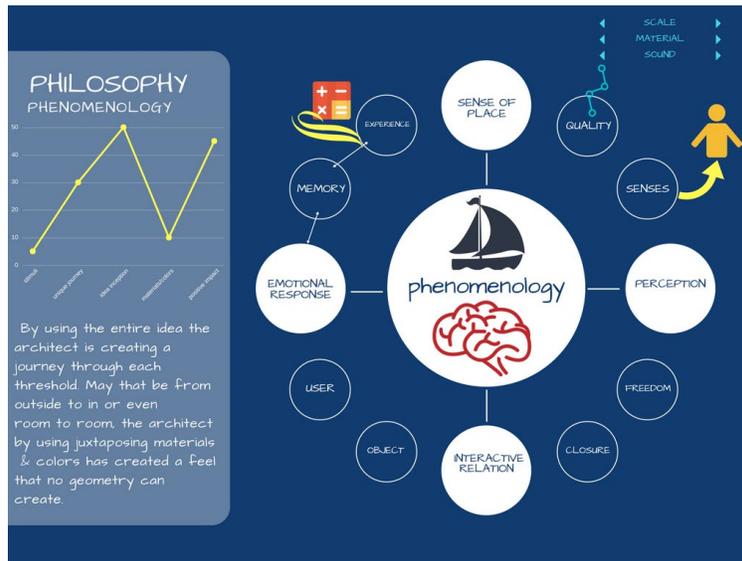


Figure 10: Schematic representation of interface between people and sea (by researchers)

The concept focuses on phenomenological approach similar to Heidegger's Hermeneutic Phenomenology, depicting the natural experience that unavoidably occurs by simply existing in the world. Heidegger's said, "People understand new things through the prism of what they know". This quote reflects the idea being used in the project of making people experience a new yet natural space that is inside out. This requires consideration of the three main factors:

- a. Distinguish between natural (landscape) and human-made phenomena (settlement).
- b. Focusing on nature, outside/inside experience.
- c. Character: "the basic mode in which the world is 'given'".

4.3 Functional Vision of the Interface between People and Sea

Man in cities needs for the main 4 issues, which are accommodation, work, moving and activities and relaxation. Within research vision, the idea is to include the main components in sustainable vision within three aspects:

- a. Social issue via recreational facilities for that serve local as well as tourists.
- b. Environmental issues within informational guides.
- c. Economic feasibility. (Figure 11)



Figure 11: Structural solution (by researchers)

4.4 Sustainable issues:

- a. Water sensitivities:

In order to solve the problem of water crisis and desalination the project will be designed as a water sensitive urban

design, focusing on four major points:

- Balance between water supply and demand, wastewater and pollution, watercourses and resources.
- Observe and recognize local character, environment and community.
- Optimizing the cost-benefit of infrastructure and built form.
- Improve quality of life for community and future generations.

b. Generating Energy using “wave harnessing energy”:

By using the technology of “wave harnessing energy” in order to generate electricity from waves and tides this method not only generates electricity but also purify water to be served for drinking purposes. The technology uses submerged buoys and pumps that would also protect the marine life by acting as artificial coral reefs.

4.5 Alternative Solution and the Initial Concept

An idea about designing a new interface between people and sea is highlighted in this research, as a solution to solve these issues. As it will save land and the marine. It will enhance the social aspects as well respecting the sustainable lifestyle as the kingdom is moving towards in its 2030 strategy. As the main aspect of this research is its structural concept, it was studied in detail along with other aspects such as:

1. Design considerations: water sensitive urban design, site considerations, architecture parameters, materials and construction etc.
2. Shoreline protection: echo sounder, tide levels, surveys, pollution and contaminant control, water sample, wave data.
3. Acoustics of underwater structures: mathematical methods, response systems, acoustical equations for different forms.
4. Universal design: design consideration for special needs and disabilities.
5. Structure systems.

Combination of deep cement mixing and sand compaction pile is an alternative solution for land reclamation that could eliminate the above-mentioned effects caused due to reclamation the main issue concerned with the project i.e. the structure. Following is a schematic representation of the conceptual approach that is being proposed (Figure 12).

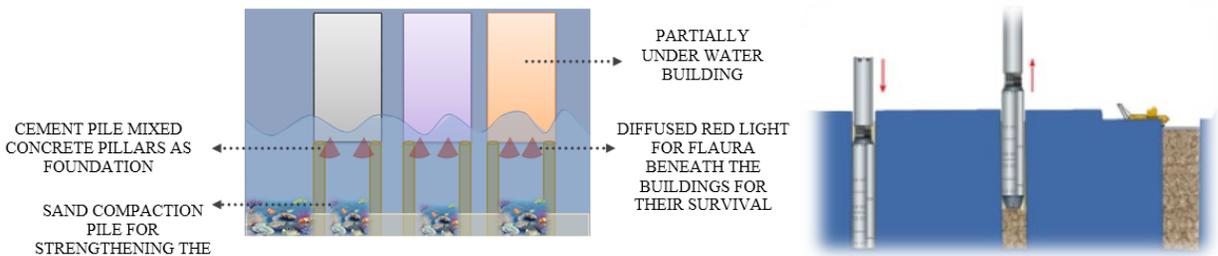


Figure 12. Structural solution (by researchers)

This combination of the structural system is more effective, 10 times less costly than raising the already existing infrastructure that would be a need in future due to sea level rise and threats of flooding. It can also be used as a barrier/ security measure against constant rise in sea-level and its effects on the coastal area.

4.6. Interrelation between many offshore platform

Inspiring from the idea of collecting neighborhood like cell within cities. Connecting between the offshore platforms following the same concept will from be developing phases. Krestaller on 1964, presented his idea in city urban expansion in Germany. It could be used to support the research concept (Figures 13, 14).

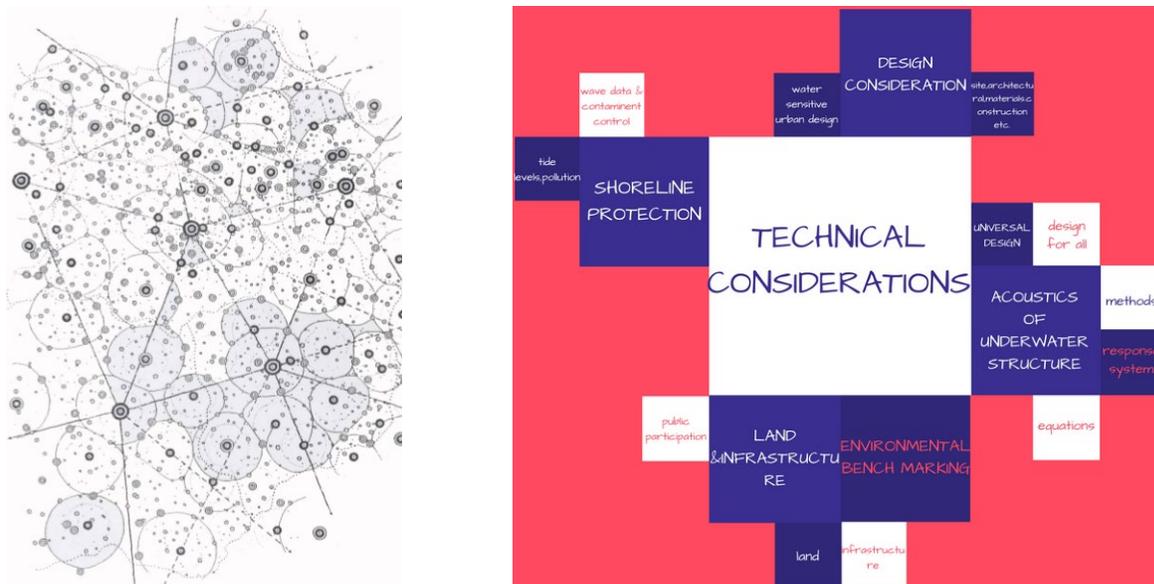


Figure 13: Inspiration developing process (Krestaller, 1964), Figure 14. Technical consideration for such project (by researchers).

5. Conclusion

The above-mentioned shows that reclaiming of land if at one point shows the modernity of a country and attracts tourists but at the same point it deprives the country men from its originality specifically in Bahrain. Water is a symbol of survival for living organisms and it serves the same purpose for the currently faced issues. It seems strange that after so many provided proofs and facts adding up in favor of the existence of GLOBAL WARMING, SEA LEVEL RISE and threats related to them, many still deny its existence. Nevertheless, as human race develops and steps into a hopefully more enlightened future, perhaps going to the very roots of our genetic programming is just as important as it always has been. Survival and Preservation of the Species. Global Warming and Sea Level Rise are paramount issues facing the whole of World's Population and technically sound and Cost-effective construction seems to be a prominent solution to these problems which can ensure safety and betterment of the Long-term future.

... So the proposal that is being suggested in this paper is that instead of reclaiming the land why not build in/on the water!!!

References

- Adriansen, H., Land reclamation in Egypt: A study of life in the new lands, *Geoforum*, vol. 40, no. 4, pp. 664-674, 2009.
- Al-Haidan, K., Central Informatics Organisation (CICO) Geographic Information Systems, Available: http://www.cio.gov.bh/cio_eng/SubDetailed.aspx?subcatid=541
- Butler, T., Dubai's artificial islands have high environmental cost, Available: <https://news.mongabay.com/2005/08/dubais-artificial-islands-have-high-environmental-cost/>, August 23, 2005.
- CFB (Citizens for Bahrain), First for Bahrain: First artificial islands, Available: <http://www.citizensforbahrain.com/index.php/entry/first-for-bahrain-first-artificial-islands>, September 21, 2015.
- Fakhro, E., Land reclamation in the Arabian Gulf: Security, environment, and legal Issues, *Journal of Arabian Studies*, vol. 3, no. 1, pp. 36-52, 2013.
- Grydehøj, A., Making ground, losing space: Land reclamation and urban public space in island cities, *Urban Island Studies*, vol. 1, pp. 96-117, 2015.
- Hsu, H.-L., Chang, Y.-L., and Lin, H.-H., Emotional architecture - A Study of Tadao Ando's genius loci design philosophy and design syntax, *International Journal of Chemical, Environmental & Biological Sciences (IJCEBS)*, vol. 3, no. 6, pp. 456-463, 2015.
- Javed, N., Significance of Artificial island in overcoming the scarcity of land due to global warming and sea-level rise, *Journal of Energy and Power Engineering*, pp. 427-434, 2017.

- Salahuddin, B. (2006). The marine environmental impacts of artificial island construction, Dubai, UAE, M. Sc. of Environmental Management, the Nicholas School of the Environment and Earth Sciences, Duke University, U.S., Available: <https://fenix.tecnico.ulisboa.pt/downloadFile/3779578854207/The%20Marine%20Environmental%20Impacts%20of%20Artificial%20Island%20Construction.pdf>
- Salimi, A., Salimi, A., and Pilehvarian N., Position of light and water in architecture and philosophy of art, *The Turkish Online Journal of Design, Art and Communication*, pp. 58-67, 2016.
- Sapru, R., The Challenges of Living Large: Scaling Up Sustainable Urban Growth, Available: <https://www.bsr.org/our-insights/blog-view/the-challenges-of-living-large-scaling-up-sustainable-urban-growth>, November 6, 2012.
- Shepard, W., The gift from the sea”: through land reclamation, China keeps growing and growing, Available: <http://www.citymetric.com/skylines/gift-sea-through-land-reclamation-china-keeps-growing-and-growing-1350>, August 25, 2015.
- Toumi, H., Bahrain parliament wants solution to land reclamation issue, Available: <http://gulfnews.com/news/gulf/bahrain/bahrain-parliament-wants-solution-to-land-reclamation-issue-1.567052>, January 12, 2010.
- Britton, B. (2013) thesis 2012 : Island city, 27 March, [Online], Available: <https://www.behance.net/gallery/7805665/Thesis-2012-Island-City> [friday september 2016].

Biographies

Islam El-Ghonaimy, a senior ranking Urban Designer and Landscape Architect Consultant since 2006 with a long-timer professional leading a 30-year experience vetting the manifold disciplines of architecture, urban design and landscape architecture. He did the honors of setting forth the consultation services in City Urban Planner for Iraq – Kurdistan Region, 2012-2016. Similarly, he has been assigned; as urban consultant for World Institute for Development Economics Research of UNU, on 2007 and 2012 and as City Development Strategy Consultant, for World Bank projects with Arab Urban Developing Institute (AUDI), Arab Towns Organization, from 2005 till 2012. Professionally, the author is a motivated eager beaver, for his encompassing disciplinary interest in Environmental Studies, Urban Planning, Management and Architectural studies equivalently.

Academically, in 2000 he has been accredited the Doctoral of philosophy degree, in "Environmental Assessment of Urban Area". Formerly, in 1995 he has been approved the M.Sc. degree in Environmental Management and Economic. In 1988, he has been certified the B.Sc. degree as an (Architect).

In 2014, he has been assigned to hold down a professor rank. Publications, the author are renowned for his dozen books and handouts, 22 white papers and Articles in Refereed Professional Journals.

Needa Javed, working currently as a research assistant at university of Bahrain, is a fresh graduate highly enthusiastic and deeply interested in the research field. In 2017, she published the first paper in the journal of energy and power engineering. Currently, she is participating in two research projects join between University of Bahrain and Department of Spatial Environmental Planning, Technische Universitat Kaiserslautern, Germany