The World After COVID-19
Urbanism & water management

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Abstract:

The purpose of this article is to raise awareness among governments, social workers and municipal and service bodies about the real dimensions of the COVID-19 pandemic that spread across the world since December 2019, and to investigate the possible solutions that are derived from human history and the recent developments in information technology, as well as how human societies are adapting to these developments. Taking into consideration that the article is researched and written in the lockdown conditions away from my library, digital media and documents were extensively used, which also included video coverage of interviews with public figures who expressed their opinions about the topic. The main findings are that the world will probably have to live with the reality of COVID-19 for some years and that certain changes will have to be made to the way we live, the way we care for and interact with others, both socially and physically, and the communication technologies we use. The world will certainly never be the same after this pandemic. *In* conclusion; further and extensive research and development (R&D) will be needed, and it has to be done wisely and in complete transparency, as it will affect us all.

Keywords: Corona; COVID 19; Urban; Urban Design; Smart City; Infrastructure; Water Management; Economic Order.

1.INTRODUCTION

The world after Corona, or more precisely the "World with Corona" is what the title of this article should be as many circles in health care and politics believe that it is more probable that we will have to live with the Pandemic for an extended period of time. And, actions were taken by governments and business communities to minimize the negative effects of the Pandemic and which have proven to be viable, sustainable, and could easily be the normal rather than the exceptional modus operandi. Working from home, online education, home delivery and video conferencing are just a few examples of what could be the new way of doing business, as these practices became acceptable to both the providers and the receivers of services. We may afterall shout thank you Corona for letting us know. The world, including the developed countries, has been taken by surprise by the Corona COVID 19 pandemic. Countries like China, Italy, Spain, Germany, the United Kingdom, and the United States are among those who got the most hits under their belly, suffering from high numbers of cases and deaths. Many views have been exchanged by

scientists and policymakers about the nature of the pandemic, what caused it, how to handle and get it to stand still, and what would be the situation in the aftermath of the pandemic. I have been looking into varieties of these opinions, which appeared in the media as articles, TV interviews, and social media elaborations. As a reader, I am not satisfied with what I have seen and read and believe that there is more into it than just suspense and trying to calm the population down. In the following lines, I would like to share some ideas on mainly how life with median urban citizens like myself will be affected by the pandemic, what things will change, and by whom. My hope and intention at this stage are not to give prophecies and ready-to-grapp solutions, rather it's to exchange ideas with those who care.
The ideas will be discussed under the following headings: The nature of the Pandemic, How the world economy will react, managing the post-pandemic world, the urban phenomenon, employment and income, education and the internet, and finally how cities implementing Smart City applications would manage their infrastructure under the new conditions resulting from the Corona pandemic.

2.NATURE OF COVID-19

COVID 19 is a viral infection caused by a virus from the Corona family. The reason why it is so deadly and widespread lies in its nature and system of multiplication which is new and the health care system has no previous experience with. The only proven method of prevention so far is by quarantine. Wikipedia https://en.wikipedia.org/wiki/Coronavirus_disease_2019 writes as follows in brief ;

"Coronavirus disease 2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The disease was first identified in December 2019 in Wuhan, the capital of China's Hubei province, and has since spread globally, resulting in the ongoing 2019–20 coronavirus pandemic. Common symptoms include fever, cough, and shortness of breath. Other symptoms may include fatigue, muscle pain, diarrhea, sore throat, loss of smell, and abdominal pain. The time from exposure to onset of symptoms is typically around five days but may range from two to 14 days. While the majority of cases result in mild symptoms, some progress to viral pneumonia and multi-organ failure. As of 9 April 2020, more than 1.5 million cases have been reported in more than 200 countries and territories,[16] resulting in more than 90,000 deaths. More than 340,000 people have recovered.

The virus is mainly spread between people during close contact often via small droplets produced during cough, sneeze, or talk. While these droplets are produced when breathing out, they usually fall to the ground or surfaces rather than being infectious in the air over large distances. People may also become infected by touching a contaminated surface and then their face. The virus can survive on surfaces for up to 72 hours. Coronavirus is most contagious during the first three days after onset of symptoms, although spread may be possible before symptoms appear and in later stages of the disease.

The standard method of diagnosis is by real-time reverse transcription-polymerase chain reaction (RRT-PCR) from a nasopharyngeal swab. The infection can also be diagnosed from a combination of symptoms, risk factors, and a chest CT scan showing features of pneumonia. Recommended measures to prevent infection include frequent hand washing, social distancing (maintaining physical distance from others, especially from those with symptoms), covering coughs and sneezes with a tissue or inner elbow and keeping unwashed hands away from the face. The use of masks is recommended for those who suspect they have the virus and their caregivers. Recommendations for mask use by the general public vary, with some authorities recommending against their use, some recommending their use, and others requiring their use. Currently, there is no vaccine or specific antiviral treatment for COVID-19. Management involves the treatment of symptoms, supportive care, isolation, and experimental measures.

The World Health Organization (WHO) declared the 2019–20 coronavirus outbreak a Public Health Emergency of International Concern (PHEIC) on 30 January 2020 and a pandemic on 11 March 2020. Local transmission of the disease has been recorded in many countries across all six WHO regions."

3.POST CORONA WORLD ECONOMY AND URBANISM

The COVID 19 pandemic has spread over most parts of the world causing closures and interruptions to the normal operation of economic and social life and businesses have come to a standstill in both industry, commerce, tourism, education, and literally all workplaces. Labor layoffs became an ordinary reaction of businesses, and millions have lost their source of income. As a result, the awaited economic crises became evident and countries and international organizations like the World Bank, the International Monetary Fund, and European Union have started to consider what needs to be done to minimize losses and putting the economy back on track. Many countries are considering that they will have to live with the Pandemic for an extended period of time, years not months.
According to a study conducted in Japan in a survey of more than 10,000 Japanese businesses, more than 63% projected that COVID-19 would have a "negative impact on their business performance". Many considered going online and remote working could create opportunities for some businesses, forcing a reflection on Japan's long-hours working culture. More time spent at home is also prompting families to reconsider traditional domestic roles. (Jones, Palumbo & Brown, 2020) (Takeshita, 2020).

Other countries have already considered the experience they accumulated during the closures had given them proof that new work protocols, like working from home, home delivery, social distancing, and remote education and conferencing are going to be the normal, not the exceptional way of doing business. At the same time businesses like transportation services, even those with online applications like Uber will suffer business losses and will have to adapt to the situation by diversification of services according to new norms that consider personal hygiene and social distancing. So the world after Corona will be the same as it was before the Pandemic. The same consideration applies to the planning and urban design and even architecture and interior design. It will be evident that the physical setup of metropolitan areas, urban densities, and the building stock, will have to be modified to adapt to the new regimes of urban interactions. This will be discussed in further detail in the following parts of this paper.

3.1.Post Corona Urbanism

To be able to generate a philosophy and a work plan to remedy the urban areas after the Pandemic, one must understand two things: urbanism and interest groups. Urbanism is the process of planning and design of cities and replanning and design after a severe change in conditions and policy. Interest groups are those citizens, groups, companies, and business communities, and the general system of governance that make them interact and work for a common cause agreed upon by most if not all.
From my personal experience, back in 1980, I was appointed by the late mayor of Amman city, Isam Ajlouni to constitute a team that will prepare a comprehensive urban development plan. From day one I was faced with powerful interest groups from within the municipality, and from the community at large. For most of them, the lack of a plan was a better option. Why? Because, they were heavily involved in an immense real estate activity to convert agricultural and vacant lands in housing, commercial, industrial, and other urban uses, and the plan may limit that activity. Urban sprawl was devastating in the vicinity of the city and its surrounding towns and villages. I thought something needed to be done. So I came up with an idea of preparing a comprehensive urban policy that includes better use of land resources in a coordinated way to the real and reasonable needs of the population and the economic and social activity that take place in the city, for the present, and in the future. Areas zoned for urban activities were estimated to accommodate 10 million inhabitants if built according to the zoning regulations in action. The population at that time was one million and could double to two million in twenty years. A waste of valuable resources of land which were mainly used for agriculture. The plan we prepared and submitted for approval in 1988 envisaged a

different policy, that of densification within the already zoned areas, and stop any new zoning. Now with the advent of the Corona Pandemic, some interest groups advocate that the city must be de-densified so social distancing and better urban design principles could be applied. This is well-said advocacy for the wrong cause, to my humble opinion. If something needs to be done it is rethinking the already zoned and largely built-up areas, to create more space for a walking, playground, transit-oriented with less private cars, and the regulatory frameworks that make that happen. In a lecture I presented back in 2017 at the Jordanian University of Science and Technology entitled: "Spatial Architecture Between Education and Practice", I drew attention that a majority of present students of architecture and planning may have to work in fields not related to the studies they are having at present. The same applies to other disciplines as well. Many of those who stated their opinions on the post-COVID-19 economy gave similar examples that will be prevalent at a much larger scale; this time covering not basic work skills, but sectors of the economy and economic class structures. Mainly mentioning those paid by the day or the hour, their chances to get employed, and their contribution to the purchasing power that keeps the economy running. So I believe that re-education and having flexible skills will be a must for the majority of the workforce in the coming days. One other concern is related to the role of the public sector in the provision of basic services like health and education and social security. As we hear many voices who once advocated privatization and liberal economy are now less enthusiastic about these trends and advocate a stronger involvement of the public sector; a drawback from the liberal economy.

Cities are the stages where most episodes of history are written and rewritten. Cities were going hand in hand with the general aims of states, democratic, autocratic, or otherwise. The way cities are planned, designed, and constructed, developed, and declined always goes in harmony with the overall story or ideals imposed by the leading class. Pandemics, however devastating to the societies and businesses, are also game-changers in the way they are shaped or reshaped. This Pandemic is not an exception and it will certainly change the way we perceive urban living, styles, and amenities. The following are excerpts from major planning and architecture media, talking about the anticipated changes:

Managing rural-urban development and linkages. This example is from Turkey; As part of their new responsibility, the Metropolitan Municipalities, MM's legal obligations to provide services have expanded to rural settlements. This requires geotechnical studies, new development plans, and a strategy for providing infrastructure services to former villages that are now designated as 'neighborhoods' within the MM. In Gaziantep, there are 670 former villages; in Malatya, there are 494; and in Mugla, 396 villages that are now designated as neighborhoods, a daunting and expensive task of preparing the spatial and comprehensive plans required by law. Protecting agricultural land from urban encroachment is a common concern across all MMs. In Mugla, the emerging priority is to limit the pressures of tourism development on agricultural land. In Malatya, the development of a landscape/green area strategy for urban and rural districts is a growing need. Gaziantep has already started a project called 'Eco-village' in Şahinbey to limit the growth on agricultural land and give directions/limitations for future developments; however, these efforts are fragmented and do not include a comprehensive look at the interlinkages across other neighborhoods. Developing local economic development opportunities for rural districts was a common theme for the MMs.
Spatial information and analysis. Evidence-informed planning has become an essential planning and management tool for understanding key trends that are influencing the economic, environmental, and social development of municipalities. Indicators are increasingly being used at different spatial scales to measure progress toward national development goals, measuring regional growth and/or disparities, and the impact of specific programs often at the local level. Each MM/utility needs some level of assistance in developing its GIS's capabilities for different purposes such as improving the efficiency of planning between the MM and the districts; raising local revenue through the identification of taxable properties;

inventorying and mapping cultural heritage sites and monuments, and mapping poverty within the MM to better understand how to target services for lower-income neighborhoods and vulnerable communities. Social sustainability. Citizen inputs, when integrated into improvement plans, services, municipal policy, governance, and investments have a more sustainable communitywide impact. Leveraging community knowledge and assets can also ensure a constructive dialogue that will align public investments with citizen priorities, strengthen accountability, and enhance social inclusion through explicit recognition of the particular challenges faced by marginalized communities. Investigating and tracking the social sustainability of municipalities/utilities aims to support partners in deepening their understanding of and the management of social aspects of their operations and activities. Pending further development, the latest social sustainability framework for partner cities are based on (a) opportunities for participation, (b) levels of engagement, (c) transparency about the availability of information, (d) transparency in terms of access to information, and (e) feedback.

How recovery built cities; Waves of epidemics following European contact in the 15th century devastated cultures across the Americas, leaving towns emptied and sophisticated knowledge lost. Cholera and other outbreaks in the crowded and unsanitary cities of the 19th century led not only to major sanitary reforms but to the institutionalization of public health measures and town planning practices. The desire for ventilation and daylight that Victorian-era epidemics reinforced influenced the streets, parks, urban spaces, and homes we planned and built through the 20th century.

Disease shapes cities. Some of the most iconic developments in urban planning and management, such as London's Metropolitan Board of Works and mid-19th century sanitation systems, developed in response to public health crises such as cholera outbreaks. Now COVID-19 is joining a long list of infectious diseases, like the Spanish flu of 1918 in New York and Mexico City or the Ebola Virus Disease in West Africa in 2014, likely to leave enduring marks on urban spaces.

For Michele Acuto, professor of global urban politics in the School of Design at the University of Melbourne, the intersection of urban design and public health is an increasingly critical territory. He's the director of the Connected Cities Lab, a leading center for advancing urban policy development; he's worked on urban health in a number of capacities, including with the European Commission and the World Health Organization's Western Pacific Regional Office. While the University of Melbourne scrambles to accelerate a COVID-19 vaccine, the Lab is working to understand the urban planning dimensions of pandemic preparedness.

CityLab spoke to Acuto about why COVID-19 could change how we study cities — and how we live in them.

Much of the coverage of the new coronavirus feels unprecedented as if this is the first time urban spaces and global movement of goods and people have given rise to the threat of a pandemic. But the stories of cities have always also been those of infectious disease.

Anyone you talk to on the urban or medical side would tell you this is not new. You can draw parallels between COVID-19 and many other epi- and pandemics, from the plague to SARS and Ebola. The line of caution we need here is not to draw too many parallels or rushed conclusions without evidence. COVID-19 is not as deadly as Ebola, which had a mortality rate of 60%, or SARS and MERS at 30%.

But if the risk of death is lower, the transmission is much higher, and that makes it challenging globally. Quarantines only work insofar as you can identify all dangerous cases, and with COVID-19's symptoms

and delayed onset, you can't spot it that easily. In that way this is much more similar to the 1918 Spanish flu epidemic, which infected 500 million and killed up to 50 million.* The question is whether we are prepared to avoid that.

Looking back, did we miss something in the way we were thinking about the intersection of urbanization and infectious disease? Were we looking in the wrong places?

Yes, to a degree. We have perhaps been a bit too biased toward global cities. COVID-19 is a story of peri-urban and rural-to-urban connections, in places that are often not on the global map. Roger Keil, Creighton Connolly, and Harris Ali recently argued for this suburban view. They tell the story of how the spread to Germany starts with a car [parts] factory in the outskirts of Wuhan. A person travels from Wuhan to Germany to help with training. This is a story of peri-urban Wuhan to semi-suburban, tertiary-city Bavaria. So sure, you have some of the global connections at airports, but it's a much more complex urban system.

This is a rich point. It's easy to look at these major cities and global supply chains, and say of course we have an epidemic — this is how globalization plays itself out. But you're telling a different story — one about non-global cities, tertiary cities, and peri-urban areas.

Yes, it's actually about a much wider set of urban areas. This is the story in Washington state [where COVID-19 first emerged in Snohomish County], or the Italian story, which is still largely suburban.

https://www.youtube.com/watch?v=IFjD3NMv6Kw 7 principles for building better cities, Peter Calthrope on TED

Giving an example from the Amman Zarqa Conurbation in Jordan, the cities of Amman, Zarqa, Salt, and Madaba and the smaller townships in between witnessed huge waves of migration from neighboring countries due to wars and civil unrest, and the Jordanian hinterland, in the last seventy years. Emigrants had to be accommodated in refugee camps and makeshift housing at the beginnings, then as the economy developed and remittances from Jordanian migrant labor in the oil-rich countries began to arrive, a huge trend of urban sprawl started until the early 1980s. Zoning additional land continued at a fast track to accommodate the need for urban plots continued without an overall plan for the metropolis, and even the separate townships, a high surplus of zoned lands was made available, and service agencies began to realize that serving vast areas with little population densities is a burden they cannot handle. The comprehensive plans prepared for both Greater Amman 1988, and Greater Zarqa 1996 both suggested a halt to urban sprawl and over zoning. Instead a replanning policy of already zoned areas with moderate urban densities and better infrastructure coverage. The second metropolitan for Greater Amman in 2010 came up with a similar policy as there was still a place to accommodate urban population and activity growth for another twenty years to come. Now in light of the post-COVID-19 concerns new sounds from planners, urban designers and architects claim that a rethinking of the adopted urban densification policy is needed to cope with low-density development claims of the post Pandemic era. As a planner who participated in the preparation of the regional development plan 1980, the Comprehensive Plan of 1988 and the creation of the Greater Amman Municipality 1987, and the Greater Zarqa Plan of 1996, I believe that this reconsideration of the urban growth policy should not be done in a reactive way to the post Pandemic fears. Instead, it must be done in the context of a Metropolitan plan that covers the total area of Greater Amman, Greater Zarqa, Greater Salt, and Greater Madaba, and accompanied by a well designed urban design policy that uses the existing urban space and street network in creating walkable areas, cycling and green areas. Otherwise, it will lead to a new wave of urban sprawl with unpredicted

consequences. The following plan shows the development of the said metropolitan areas over time since the 1950s.

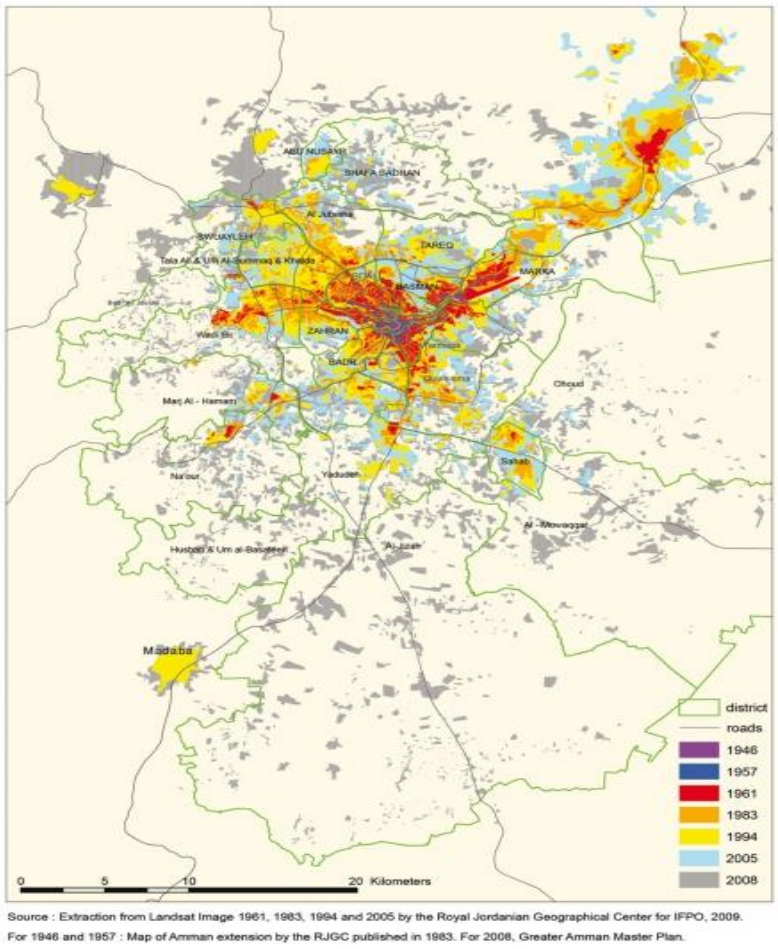

Figure 1. Urban development in the central metropolitan region in Jordan, showing the geographical spread of development. Almost six million urban inhabitants live in this area out of 9.4 million total country population.

4.EDUCATION AND THE INTERNET

The World Economic Forum states in a study that The internet is a fundamental part of daily life that delivers immense economic and social benefits around the world. In 2018, internet connectivity finally reached over half the world's population. Yet some 3.4 billion people – about 50% of the world's population – are still not online.

Although much progress has been made in closing this digital divide, the challenge remains overwhelming, complex, and multidimensional. It requires a collaborative, multi-stakeholder approach to overcome four key barriers to internet inclusion: infrastructure; affordability; skills, awareness, and cultural acceptance; and relevant content.

The World Economic Forum launched the Internet for All in 2016 to provide a platform where leaders from the government, private sector, international organizations, non-profit organizations, academia, and civil society could come together and develop models of public-private collaboration for internet inclusion globally.
Significant barriers to digital accessibility and connectivity still exist worldwide. Almost one-third of the world's inhabitants cannot access 3G coverage. Meanwhile, 80% of online content is only available in one of 10 languages, excluding millions of people.
Importantly, the internet is also the fundamental enabler of the Fourth Industrial Revolution. The industries enabled by the Fourth Industrial Revolution are likely to reshape the global economy, creating immense opportunities for those able to develop them.
The internet has become a pervasive and fundamental part of daily life. Its impact on both economic development and solving problems in areas such as health, education, basic financial services, and agriculture is well documented. But, more than half of the world's population is still not online.
Populations are not connected because they live in hard-to-reach areas or do not have access to digital or other basic infrastructure. Some do not see the benefits of being connected, often because of limited relevant digital content. Still, others are illiterate, and many are poor. Inequality – in terms of gender, income, or other factors – compounds the problem.
The barriers are real, and the costs are high. But we need to ask ourselves: what are the costs of inaction – of not extending access and use? (WEF 2020).

Developing new economic and business models that are digitally driven, creating sustainable value for an inclusive economy.

The Fourth Industrial Revolution is rapidly driving transformational disruption across every sector. By 2022, over 60% of global GDP will be digitized. An estimated 70% of the new value created in the economy over the next decade will be based on digitally-enabled platforms. Currently, about 50% of the world's population does not participate in the digital economy at all – and growth in internet adoption is slowing. The G20's Global Infrastructure Hub estimates a global funding shortfall of nearly $1 trillion for information and communications technology infrastructure by 2040.

The COVID-19 pandemic has driven big spikes in interest in telemedicine software, electronic signature tools, and Web conferencing platforms, according to recent research from Trust Radius (Covid-19, 2020) The biggest increase in interest since March 9 has been in the telemedicine software category, with search impressions up 613%. That's followed by the electronic signature (+511%), Web conferencing (+500%), mobile app development (+366%), antivirus (+357%), remote desktop (+281%), video platforms (+265%), webinar (+226%), Web portal (+199%), and live chat (+194%) categories. The products with the biggest spikes in interest since March 9 on the Trust Radius (Covid-19, 2020) platform are Intermedia Any Meeting (Web conferencing category), Google Classroom (learning management system), Blackboard Collaborate (web conferencing), Zoom (Web conferencing), and Webex Events (webinar).

4.1.The Fastest Growing Software Categories During COVID-19

The COVID-19 pandemic has had a staggering impact on every element of life. It's impacting both personal and professional lives. Companies are closing, businesses are struggling but amidst the chaos – some software companies are thriving.

Global SaaS sales were projected to reach more than **$132 Billion by the end of 2020,** but since the outbreak, SaaS companies have been laying off staff, investors have been writing essays about the importance of cutting back spending and many are guessing that there will be a significant downturn in SaaS revenue. Yet… The differences between the way the world operated during the last financial crisis (2008) and the world today are significant.

Technology is much more advanced than it once was. People are being advised to stay home and thus, they're spending time online. And many organizations are trying to operate as usual but with staff working entirely from home. So that leads the industry to ask a simple question:

What software are people looking for?

To answer this question, the team at Trust Radius (Covid-19, 2020), a review site for software & service companies analyzed traffic data across all of their categories compiled a list of the fastest-growing. The results are in:

1. Telehealth Software
2. Electronic Signature Software
3. Web Conferencing Software
4. Antivirus Protection Software
5. Remote Desktop Software
6. Video Platform Software
7. Webinar Software
8. Web Portal Software
9. Live Chat Software

5.SMART CITY, SMART BUILDINGS, AND SMART INFRASTRUCTURE

Smart city solutions would become a rather necessity in cities for many reasons: *First*, as people become digitally connected, they will need to utilize their connectivity in making their lives easier, more time and energy conscious, more productive in terms of unit per person per time unit and more open to social, cultural and technological interactions. *Second*, service providers will tend to maximize their profit by using technological advancements like the Internet of Things IT and even the Internet of Everything IET and Machine Learning (ML) in the design, operations and spreading their service to a wider audience, this in specific will make the utilization of scarcely available resources like water, energy and mineral resources more economic and more justly available to all. Smart City applications will be specifically utilized in urban systems like transport, and many successful examples are already in place in large metropolises around the world.

As the Corona Pandemic has forced millions around the world to stay home for extended periods, people had a chance to put into practice concepts like remote education, working from home, using home delivery services, attending educational, work, and cultural interactions using Webinars. This allowed individuals and businesses to rethink their work and life routines and use these facilities on a more permanent scale. A positive by-product of the Pandemic. To give an example of developments in infrastructure provision in urban areas, it would be useful to examine the anticipated developments of the products of the Fourth Industrial Revolution is one of the most stressed resources of our urban life in the coming years, namely water.

6.THE WATER CHALLENGE

Hundreds of millions of people across the planet do not have access to safe drinking water. Billions suffer the health impacts of poor sanitation and millions of others live without sustainable supplies of water, or are threatened by floods or droughts.

Without improved sanitation and sustainable supplies of water of sufficient quantity and quality, many countries will suffer from increased poverty and disease, food and energy insecurity, economic dislocations, and cross-border and regional tensions. These problems have the potential to undermine economic development, exacerbate migration pressures, increase civil unrest, aid terrorist recruitment, reduce trade and export opportunities, and prevent countries from advancing policies and programs important to the United States. Safe water and sanitation are fundamental to solving challenges to human health, economic development, and peace and security.

Water problems are difficult to solve. The poor and marginalized, in particular women and girls, are the most difficult to reach. Local capacity is often weak and financial resources limited. Water-related issues are frequently not a priority for local or national governments; this is especially true for sanitation. Weak policy and regulatory environments can make local capital hard to find and hinder coordinated decision-making around the management of water resources. At a national level, water is often viewed as a strategic resource with national security implications.

Water is also an opportunity. Water is an entry point to advance core democratic values around equality, transparency, accountability, women's empowerment, and community organization. Governments that deliver basic water and sanitation services are often seen as working on behalf of the people – creating a more stable environment. Countries that cooperate on the water are less likely to go to war and networks established for water and sanitation service delivery have been used to strengthen community responses to challenges such as Ebola and other infectious disease outbreaks. In other words, water can be a means of strengthening governance, civil society engagement, and resilience at all levels.

Finally, the United States benefits directly from engaging in international water issues. U.S. technologies, experience, and best practices are in high demand, which presents an opportunity for the U.S. private sector. The global water and wastewater market currently exceeds $700 billion annually and is growing. Demonstrating U.S. approaches and technologies globally can increase U.S. exports and jobs. Work on water globally gives us access to knowledge and expertise that can help us address water-related challenges at home

Gillan Taddune, CEO of Banyan Water, notes in an article titled "Water Wise: The Role of Water Management in the Smart City Revolution" that appeared in Environment + Energy Leader;

"By the year 2050, the United Nations predicts, the global population will have risen to an astounding 9.8 billion people. While our population surges, a dramatic relocation is occurring, drawing individuals from rural areas to urban hubs. The drivers of this migration—economic opportunity and quality of life—will bring an estimated 70% of the global population to cities by the time we reach 10 billion human beings, according to the Population Reference Bureau. This means literally millions of more people inhabiting the same cities we live in today; where networks like energy, transportation, and water treatment and distribution are already stressed. We can also expect the emergence of an expanded global middle-class, set to deservedly become prosperous consumers. To support this kind of population density, cities around the globe are going to require major improvements to infrastructure and efficiencies.

"Smart water" is one of six components that define a smart city; the others include energy, mobility, buildings, public services, and integration. The goal of these efforts is to make the city more sustainable

and efficient, according to Water World, and effectively improve the quality of life. Smart water generally refers to a holistic approach to managing this priceless resource, and the infrastructure systems surrounding its sourcing, treatment, and delivery. As we update and invest in our water infrastructure with more internet-enabled tools, and a wealth of data becomes available, these networks must communicate with one another. This will allow for not only the measurement of important indexes such as reservoir and groundwater supply, and triage of infrastructure updates, but will improve efficiencies across water-related disciplines. As an example, Water World cites predictive capabilities of flood mapping when looking at historical flood data paired with real-time and predicted weather and precipitation data.

By recognizing anomalies in consumption patterns for both the utilities and end-users, cities can optimize and eliminate water waste and cost in delivery. The high-energy demand of a city's water treatment and delivery networks are often underestimated, meaning that improving operational efficiency through actionable data will reduce greenhouse gas emissions and cut costs simultaneously.

It seems as though the impact these technologies could have on problem anticipation is boundless. Automatically prioritizing repair projects will help avoid major catastrophes like what happened to the Oroville Dam in California in 2017. As global water demand grows and climate change creates a question mark in the future of water's security, likely, we won't be able to afford resource losses at this scale. Perhaps a network of water treatment plants communicating in real-time as a system of checks and balances could have prevented or at least mitigated the damage done to the community in Flint, Michigan.

Implementing smart solutions comes with pivotal—and sometimes costly—challenges and limitations. To update our aging water infrastructure with the most current technologies, tens of billions will need to be spent through both public and private investment. Juniper Research estimates $15 billion will be invested in software alone by 2021. In addition, smart sensors need the power to take readings, creating a huge new source of energy demand. Small scale solar can work in some areas, but is it likely that cloudy Seattle or a Chicago winter will maintain enough light to power these tools? As these systems and sensors age or as technology improves, who will bear the rising maintenance costs of smart infrastructure? There are also significant issues of privacy to address and whether all this data and information should be available to the public. What sorts of security measures will need to be taken to ensure the safety of our water resources from terrorism and cyber attack? These are all questions that will require input from the public, private and NGO stakeholders to resolve.

Though we do not have all the answers today, now is the time we must start investing in this smart infrastructure. On a global scale, it is even more important as developing countries are some of the most densely populated places on the planet. We must ensure access to the most powerful and modern tools available as industrialization sweeps the globe. To invest in anything but the most current technologies will be more costly in the long term and may risk human health and safety in dense urban areas.

Luckily, the cost of these technologies is set to rapidly decline in the coming years, making smart solutions more feasible and powerful than ever before. Frankly, if we do not steadily move in the direction of smarter and more efficient cities, we won't be able to handle the overload of people that is inevitably coming in the near future (Taddune, 2018).

Traditional water systems in urban areas have been developed using available resources, usage habits, sanitation conditions, and network technologies. Most of these parameters may still be available for many years to come, but utilizing digital developments will certainly be beneficial to both the providers and receivers of this vital resource. Traditionally, the following policy approaches were developed as the

population increases over time: Comparative easy access to water at low cost and simple technologies were utilized in a low inter-sectoral competition that is easily maintained. As population increases, service providers have to get into a supply management phase, where technical and logistic challenges become more apparent and cost increases. In the following phase, service providers are obliged to have a holistic view on the water, where intersectoral competition becomes more evident and complicated to maintain, and environmental competition becomes more of daily business, as sectors compete for lower cost and less controlled environmental management. In the highest phase of operational stress, service providers are forced to get in-demand management, as the resources become more strained, and costs and technical complexities become major issues. Some of the methods applied are scarcity values, allocation priorities and a continuous effort to achieve the best possible overall use. The following figure which is adopted from a figure that appeared in a European Union report on cooperation on water resource management simplifies this development. Figure 2. Development under conditions of growing water scarcity must be based on a strategy where the best possible use of available resources will be stimulated, probably alongside scrutiny of the need for additional withdrawals. A combination of supply-side and demand-side management will be natural as countries climb "the management ladder".

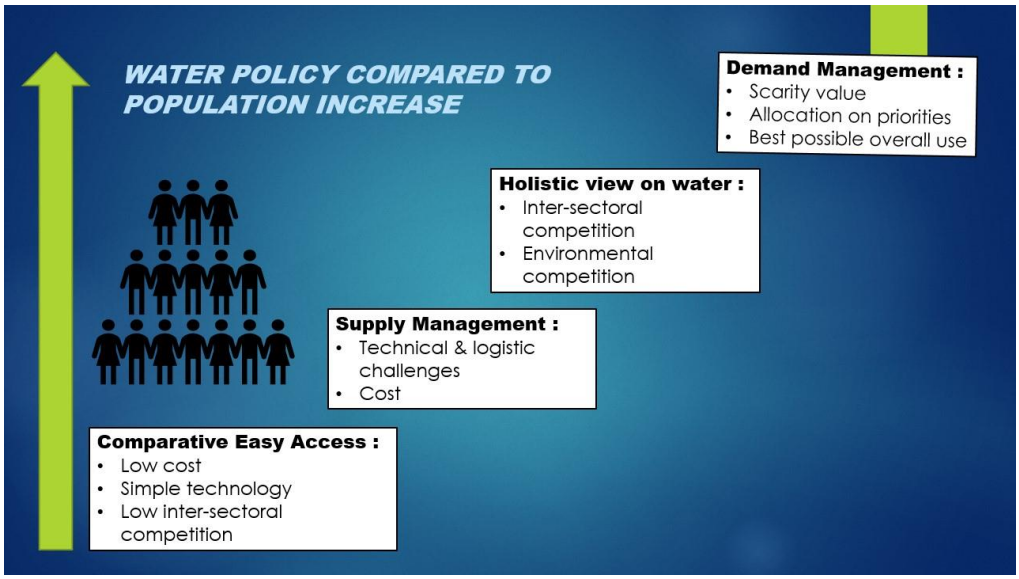

Figure 2. Increasing population in relation to available water resources.

Water Management in Developing Countries - Policy and Priorities for EU Development Cooperation, A Background Document for an EC Communication on Water and Development
The recommendation was performed by the Stockholm International Water Institute (SIWI).
Lead Author Dr. Gunilla Björklund.SIWI Report 12 Published 2001 by Stockholm International Water Institute Sveavägen 59 SE-113 59 Stockholm Sweden.

Integrated Water Resource Management - Cross-sectoral coordination with other development sectors: In addition to its importance for human survival and well-being, water is a basic ingredient in many productive and non-productive activities. As already outlined, there are many cross-sectoral considerations to be taken into account, and there is a need to apply an integrated approach when indicating the policy priorities to focus on. When growing and incompatible sectoral demands claim for more water, choices will have to be made in terms of how should the water withdrawn be allocated between different sectoral uses,

including food security, industries, and energy, environment, etc. Such allocation challenge is particularly pertinent in areas where the overall availability is poor. It could be choices between major urban centers including the peri-urban areas and the surrounding agricultural lands and wetland ecosystems. It must be handled through a combination of regulatory measures and managing principles.13 This implies in particular moving towards pricing water services to reflect the cost of their provision. Effective systems to assess the value of water are necessary, to balance economic efficiency against social equity or environmental sustainability.
Organizational water footprint consists of two elements; Direct water, water used from taps, or irrigation systems from countries' resources. And, Virtual water, water used through the life cycle of a product or activity (from cradle to grave), more complex to measure but not less important. From Water, the next Carbon, discussion paper, ACCA. (www.accaglobal.com).

- **Smart water meters**. Around 60 percent of the city's 500,000 water customers have smart meters, which gather data on water usage every 15 minutes. In the future, this technology will give customers real-time leak alerts and conservation advice.
- **Proactive roadside air filtration**. Bridges along the city's main overpass are fitted with air quality monitors and air filtration technology, which senses and cleans pollution to prevent it from affecting nearby neighborhoods.
- **Community sentiment analysis.** Houston uses Zencity technology to analyze data from social media and the internet, identifying trending topics to understand residents' opinions about the city.

7. PUBLIC OPINIONS

The current Pandemic came in a time of widespread digital media, and almost everybody with a computer or smartphone contributed to the exchange of opinions on the causes of the Pandemic, the precautionary actions taken by authorities at all levels, and even suggested remedial steps to the effects of the Pandemic. Locally speaking for Jordan, Maen Qatameen, a Jordanian web personality, and economist stated the following possibilities for economic development that occurred in front of the Jordanian economy in the post Corona era:

- *Online businesses as professional services,*
- *Online reach to neighboring markets will give Jordanian professionals and businesses a wider reach to outside potential customers, doctors, engineers, lawyers, etc.*
- *Full operation will give the Jordanian economy a competitive edge, especially as other countries are still struggling to get out of the Pandemic.*
- *Online learning will give schools and higher education a chance to reach a more diversified community locally, nationally, and internationally, as education establishments will minimize the need for class space, transportation, and support staff.*
- *Intelligent government, better abilities to reach, analyze, and develop the services provided by ministries, municipalities, and non-governmental organizations.*
- *Artificial Intelligence AI, machine learning, and robotics will be more widespread and will enable service providers to reach previously unthinkable levels of efficiency, minimize time, and lower cost.*

- *Online media, as communication networking and production, viewing mediums are more widespread, will open better markets for entertainment, culture, and sport and will open better business opportunities for media companies, like Netflix which has increased its share in the market by 40% during the Corona Pandemic as people where forces to stay at home. Small producers will also benefit from this growth of the business.*
- *Online work from home for office staff, will benefit businesses as they will need less office space, transportation, and energy to provide a service.*
- *Online marketing services and delivery will open new frontiers for small and large businesses to reach a more diversified customer body and growth of employment and skills.*

The Corona Pandemic has given communities an unprecedented chance to test the actual operation of these applications. A chance will never be available in normal times. Qatameen, in another TV program, explains how COVID 19 has contributed to the actuation of the digital revolution and governments that used to do lip service on the importance of digitalization, with very little real effort to take real steps in making the fourth industrial revolution a reality. In Jordan for instance open data and the smart government is still in the twilight zone despite available well trained Jordanian professionals who are capable of creating this system, and they are employed in different countries on these applications. (Mark Zuckerberg and Yuval Noah Harari conservation 26 April 2019)

According to Yuval Harari**,** the famous bestseller author of "Sapiens" argues in a public interview, that a gradual shift is taking place from humanity to algorithms, algorithms that understand you better than you understand yourself!. We are moving towards being hackable animals, as Biotechs become more common. In the former Soviet Union, the KGB, the secret service of the state, collected enormous amounts of information about individuals, families, and groups to anticipate their possible actions against the state. But they lacked sufficient means to analyze the piles of dossiers to understand what the actual beliefs and anticipated actions would be. Instead, they have to act on a selective basis, which did not reflect the reality in most cases. With the available means of information technology, accurate anticipation of human actions are possible, and even hacking of human feelings could be done in a most accurate way. A story has to be formulated to start any social or technological change.
One perceived development of technological development and especially in machine learning is that a new class of humans will be a massive problem in front of governments, that of useless citizens! As more people become unemployed and can generate no income, by the result they become unable to spend on goods and services. People will become gradually more connected by the means of information technology, but without being in harmony. And that in itself will be a major problem in future societies. In the upcoming digital Metabolic world, we will not have people who are employed, and unemployed, we will have citizens who are doing things useful to the society, and simply useless people, they don't produce anything, they have no jobs that they are paid for, and thus have no resources to spend on buying products.

Noam Chomsky the famous American philosopher, explains the post-Corona world as follows: Cities are becoming Metropolitan in terms of planning, management, economic development, and infrastructure. This development is not necessarily what the business community likes, because they believe that dealing with dispersed municipal bodies is more beneficial to them, in terms of taxation (and tax evasion!) and licensing for businesses becomes cheaper. Harari, says that in another interview, the post Corona era and gradually into the 2030s and further on, control will shift from humans to algorithms. Algorithms that understand you better than yourself, it's info technology with Biotechs. So, we will be hackable animals. In the past Soviet era, the KGB was piling up information about every citizen, but had no means to process

that huge amount of data, and had to act on a selective basis in treating citizens. A story has to be told to create a hackable city which is part of a Metabolic system.

In his contributing article to the report on the effects of Covid-19 Pandemic on the Jordanian economy Jaafar Hassan an ex-minister of planning, and a once fierce defender of privatization in the economy, states that the COVID 19 Pandemic has accelerated the transmission to wider use of information technologies and entering the era of the fourth industrial revolution, in fields like education and remote learning, work from home, remote negotiation, and artificial intelligence AI. Adding that these developments will not replace traditional ways of doing business, but will be more widespread, and Jordan will be urged to provide the needed infrastructure and the regulatory framework for its operation. The government will be more electronic rather than conventional. Dr. Hassan also defended in his article that the role of the public sector will be more vital in the provision of services. This is worth noting from a defender of privatization and active implementer of the transfer of many basic industries from public to private property. This opinion is also supported by columnist, MP Jamil Al Nimri that the Jordanian policy must be; Let's be poorer, but happier in the post-Corona era.
Another article by former foreign minister Marwan Muasher defends that; in the work plan for national action after the Pandemic should consider the protection of the working class and its sources of income, and work must be done with the private sector to secure availing the necessary funds for a firm, and a gradual return to full operation of the economy. Paying up of national debts to foreign aid agencies should not be a priority at this stage, according to Muasher.

8. LESSONS LEARNED

The current pandemic challenges contemporary planning prescriptions for urban livability and economic vitality. Cities face significant risks during density-susceptible epidemics, with numbers of cases and death rates linked to population density and city size. Many cities have closed the green spaces intended to provide recreation for the residents of dense neighborhoods, leaving home-bound residents of small units feeling trapped, especially if they have children to keep active and engaged. The poorest urban residents lack adequate shelter and sanitation to stay safe and socially distanced. Essential transit systems often feared as nodes and corridors for virus spread, are operating below capacity. Mixed-use zones with concentrations of cafes, fitness studios, and restaurants are struggling to survive as the "third places" valued for social interaction have had to go virtual. Higher death rates among racialized populations and racist attacks against Asian residents threaten planning's commitment to diversity and integration. The usual strategies for designing cities may need to be reconsidered.

8.1. What can cities learn from lockdown?

What lessons can cities draw from this crisis to inform future planning? We may need to reconsider the push for higher urban densities. Crowded housing increases contagion risks. After being cooped up in towers for months on end, urban dwellers may begin to look at suburban lots more longingly than they did in the past: living preferences may change. Everyone needs some access to outside space for mental health and exercise. We may want to consider broader park paths or longer benches that enable physical distancing, or better strategies for managing who uses space when. Those who can walk to work or shop are appreciating that ability during these times, but we need to ensure that more have that choice. The pandemic has brought inequality into stark relief. Everyone needs a living income to keep us all safe. Governments need to plan decent housing for all, not only for social justice reasons but for public health.

Although it's too early to predict the long-term impacts of the pandemic on our cities, our societies and ourselves, we know that things will never be quite the same again. We need to learn the lessons of our current difficulties and plan effectively to meet the challenges ahead.

Smart metering and smart water demand management can also save a lot of money that would be otherwise needed to remedy the consequences of not having a smart water management system. For instance, if you invest one 1$ on improving the water supply system, you can save 8$ on health. Many municipalities and water supply companies claim that in some cases up to 50% loss of water as non accounted for water, which the authorities fail to identify where it really goes.

8.2.Roadmap For Future Work

The road map to be adopted by the governments and municipalities in the post-COVID 19 policy making, could be as follows, and subject to further elaboration by individual professionals and think tanks:

1. Comprehensive coverage of the performance of the economic sectors, businesses, and employee groups should be prepared and made available to national, sectoral, and international entities. This can help decision-makers to base their decisions on a solid, reliable data source.
2. Creative solutions should be developed for governments and local authorities for maintaining public hygiene and social distancing while allowing businesses to operate and meet the requirements of the population in terms of basic necessities and personal services.
3. As some businesses which are dependent on high occupancy rates, like mobility, food and beverage and tourism, proved to be the most affected by the Pandemic, action must be taken to put new regulatory norms that would allow them to return to business gradually until full operation.
4. Special attention must be given to widening the use of communicative and data-based applications that make distance learning and work from home more widespread. Such applications may need a regulatory framework to operate in certain countries that would protect stakeholder rights, transparency, and the right to information and data security.
5. Urban planners, architects, and spatial designers should be specially invited to come forward with solutions to maintain social distancing and de-densification of neighborhoods and cities using to the extent possible the existing building stock and roadway space, and protecting the natural environment at the same time. A new dimension of spatial planning will have to emerge after this Pandemic. Planning think tanks, universities, and professional associations must make that possible through online Webinars, research, and publications. Local authorities must help in formalizing these activities and turn the resulting ideas into operational tools.
6. Resource management especially in the fields of water, energy, and food production must be developed in accordance with new norms of sustainability, maintenance of public interest, and stakeholder involvement, and engagement. Public agencies like ministries, universities, and municipal bodies should prepare the grounds for these developments.
7. Water being one of the most critical resources to sustain human life, should be given a priority in the selection of best development options, and activities with low water footprint should be selected from a variety of options.

9.RESULTS & CONCLUSIONS

This paper has been an eye-opener for me in many ways; First being locked down at home away from personal interaction with colleagues and the general public, has urged me to be 100% dependent on the internet and social media, and I found it quite satisfying, as did thousands of researchers and public policy

analysts all over the world. For all of us, a new era of interaction and dialogue has started. Second, Being home locked, people who needed to work and reach community services were urged to use available networking and online facilities to use these facilities at its fullest for working, education, receiving home delivery goods and webinars to connect with groups that share their areas of interest. All this has been an opportunity for experimenting with the actual use of online applications. Something that has been advocated for a long time, without having a chance for implementation in the real world.

Two areas of interest for me in person and many colleagues with which I have been in contact with, namely urbanism and water resource management under Pandemic conditions, have also found their way to be tested in real-world conditions. Although we have not found the resources, nor the arrangements to do real scientific research, what we found through observation and dialogue was more than satisfying. I am sure that many institutions and experts on the matters have come to similar convictions.

The expected high population growth reaching a world population of more than nine billion until the year 2050, seventy percent living in cities, will put a great burden on already strained urban areas as well as on the rural hinterlands which are drained from natural resources, agricultural land, and natural resources. As being not enough problematic to a sustainable livelihood, the Pandemic has come with additional threats and needs for action; Urban densification policies to maximize the use of available resources and infrastructure, are now considered outdated and need to be replaced by less densely populated areas, a return to nature and rural living and redesign of city space to allow for social distancing. Even the trend to use transit instead of car-based urbanism has been under reconsideration for some. This situation really needs further scrutiny by academic and practitioner circles to come up with solutions that are not reactionary but sustainable and economically viable.

Water resource management is another area of priority for research and development R&D as it relates primarily to human basic needs, and to the soundness of infrastructure design and implementation to meet human needs and agricultural production will be most needed and at a high priority on decision-makers tables. As water resources are already strained a new policy of Demand Management should be put in place. This in my opinion is a priority that must go hand in hand with any urban policy. Urban area management and planning will also need to be rethought of, not only in nature and scale but also in pure geography. A three-level policy should be considered; Metropolitan, City, and Local level analysis and intervention. This is also a new scale and field of interest that planners of urban development and systems should consider in the post-crisis era.

At last, a work plan must be formulated at the city, region, and state levels, to deal with all these considerations. From my side, any attempt to propose such a plan would be arbitrary and lack a practical basis, if not done by a well-formulated professional arrangement. So, I suggested a roadmap for action that will give the general framework for such a policy and planning.

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