United Nations
Educational, Scientific and
Cultural Organization

انجمن ترویج علم ایران

International Workshop (Virtual)
On
COVID-19 and Water Consumption Pattern

Tehran- Iran

November 11, 2020

United Nations
Educational, Scientific and
Cultural Organization

UNESCO/UNITWIN
Network on Gender, Culture,
and People-Centered Development

Contents

Introduction 2

Opening 6

COVID-19 and Water Consumption Pattern; Dr. Alexandros K. Makarigakis 11

Water Importance and Demand in COVID-19 Pandemic Era; Prof. Simin Nasseri 17

COVID-19 IMPACT ON WATER CONSUMPTION IN JAKARTA; PRIYATNO BAMBANG HERNOWO; PAM JAYA 23

Lessons learned for water resources planning and management COVID-19 Pandemic; Dr. Banafsheh Zahraei 32

WATER CRISIS: CORONA PANDEMIC AND AGGRAVATION OF ENVIRONMENTAL CRISES; Dr. Mona Khaleghi Rad 42

Disasters, Water, and Health: An Evolution in Approaches; Dr. Abbas Ostadtaghizadeh 52

Sustainable water resources for municipalities; Dr. Shina Ansari 58

Covid 19 and the pattern of water consumption with a focus on per capita water consumption in Iran and water consumption management strategies; Mr. Seyed Ali Seyedzadeh 64

A Brief Summary 70

Dr.Alexandros Makarigakis, Programme Specialist, Water for Human Settlements, UNESCO Headquarters 70

Dr. Akram Ghadimi 71

Appendix 72

Introduction

With the global outbreak of the Corona virus, water consumption has reached alarming levels, and experts believe that the current consumption pattern will lead to severe water shortages in various countries. Dehydration is no longer a slogan. What is threatens the water security of our society is that surface and groundwater resources are out of our reach, or rather, most of it is out of reach. The prevalence of Corona virus and the importance of paying attention to personal hygiene in this critical situation has greatly increased the water consumption, so there is a need for serious and public attention to water management.

The outbreak of the Corona virus has raised the alarm on how to provide safe water to human society. In other words, the Virus on the one hand and the global water crisis on the other hand, have caused double concerns among researchers, although this is the case in countries such as Iran which is located on the dry belt.

Iran is located on an arid and semi-arid belt which means that the amount of precipitation is between one third and a quarter less than the global average. On the other hand, its evaporation is usually 50% higher than the global average, so a quick calculation shows that Iran is short on water resources.

However, according to experts and related resources, per capita water consumption in Iran is twice the world standards.
Despite such a shortage, Iran is among the countries that consume about 80% of its available water reserves annually, which means that we are in a "very critical" situation that is worth pondering.
Although there are several strategies to address and deal with the spread of the COVID-19 in the world, the World Health Organization (WHO) believes that frequent washing of hands can help reduce the likely spreading of infection and infectious diseases, they believe that poor sanitation and limited access to hand washing facilities lead to the deaths of millions of people worldwide.

Objectives of the workshop:

- Represent the importance of proper use of water resources
- Awareness of the community and promoting the correct use of water
- Creating a culture and trying to improve the pattern of water consumption

Water consumption management

Specialized audience of the workshop:

- Water field activists
- Health district activists
- Environmental activists

- Journalists and journalists in related fields
- Public relations experts of related institutions
- Students, researchers and professors of related fields

Organizers:

- UNESCO Tehran Cluster Office
- Iranian Association for Popularization of Science

UNESCO Chair Popularization of Science (NRISP)

Tentative Agenda

Workshop on COVID-19 and Water Consumption Pattern”

11 November 2020- 14-17 (GMT+3:30) *Platform: Webex*Languages: Farsi/ English

Time	Topic	
14:00-14:10	Recitation of the Holy Quran – National anthem	
14:10-14:20	Opening Remarks	**Dr. Akram Ghadimi,** Head of Iranian Association for Popularization of Science & Chairholder UNESCO chair on Popularization of Science (NRISP)
14:20-14:25	Welcoming Remarks	**Mr. Cvetan Cvetkovski,** Officer in Charge, UNESCO Tehran Cluster Office
14:25-14:30	**Video Clip- Group Photo**	
14:30-14:45	COVID-19 Implication on Water Management in Megacities	**Dr.Alexandros Makarigakis,** Programme Specialist, Water for Human Settlements, UNESCO Headquarters
14:45-15:00	Water Importance and Demand in COVID-19 Pandemic Era	**Prof. Simin Nasseri,** Professor of the Department of Environmental Health Engineering and Deputy for Research, School of Public Health, TUMS, Dean, Center for Water Quality Research (CWQR-IER), Tehran University of Medical Sciences (TUMS), Head, Environment Group, Iran Academy of Sciences
15:00-15:15	COVID-19 Implications on Water Management in Megacities- Jakarta Case	**Dr. Priyatno Bambang Hernowo,** President Director of PAM JAYA, Indonesia
15:15-15:30	Lessons learned for water resources planning and management from COVID-19 Pandemic	**Dr. Banafsheh Zahraie,** Associate Professor, School of Civil Engineering, University of Tehran, Director of Office of Water Consumption Management, Ministry of Energy
15:30-15:35	**Video Clip**	
15:35-15:50	Water Crisis: Corona pandemic and aggravation of environmental crises	**Dr. Mona Khaleghy Rad,** Environmental and Occupational Health Professional Officer, World Health Organization
15:50-16:05	Water, health and epidemic management covid19	**Prof. Abbas Ostadtaghizadeh,** Director of Disaster Health Department, Tehran University of Medical Sciences

16:05-16:20	Sustainable Water Resources for Municipalities	**Dr. Shina Ansari**, General Director of Environment and Sustainable Development at Municipality of Tehran
16:20-16:35	Per capita Water Consumption in Iran and Consumption Management Solutions	**Mr. Seyed Ali Seyedzadeh,** Director General, Public Relations of Iran Water and Sewerage Engineering Company
16:35-17:00	Open floor for Q&A, Conclusion and Closure of the Workshop	**UNESCO and IAPS**

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OR http://learning.ilisa.ir/c19w/

Opening

The international workshop on COVID-19 and water consumption patterns was held on November 11th, celebrating World Science Day for Peace and Development after a day delay by Iranian Association for Popularization of Sciences and the UNESCO Tehran cluster office with attendance of both native and foreign experts. The meeting began after a recitation of a number of Holy Quran’s verses. Firstly, Ms. Mehrdadi, the programme manager, presented a brief review of the workshop plan as well as thanking and welcoming the audience.

Dr. Akram Ghadimi, Head of Iranian Association for Popularization of Science & Chairholder UNESCO chair on Popularization of Science (NRISP)

Greetings and respect to all distinguished professors, speakers, distinguished guests and those interested in popularization of science, First of all, I would like to thank
Mr. Cvetan Cvetkovski, Officer in Charge, UNESCO Tehran Cluster Office,

Ms. Mehrdadi, Head of the Science Office of the UNESCO Regional Office in Tehran.

Dr.Alexandros Makarigakis, Programme Specialist, Water for Human Settlements,UNESCO Headquarters –

Dr. Priyatno Bambang Hernowo, President Director of PAM JAYA, Indonesia

Prof. Simin Nasseri,

-Professor of the Department of Environmental Health Engineering and Deputy for Research, School of Public Health, TUMS, Dean, Center for Water Quality Research (CWQR-IER), Tehran University of Medical Sciences (TUMS),

Head, Environment Group, Iran Academy of Sciences **Dr. Banafsheh Zahraie,**

Associate Professor, School of Civil Engineering, University of Tehran, Director of Office of Water Consumption Management, Ministry of Energy

Dr. Mona Khaleghi Rad,

Environmental and Occupational Health Professional Officer, World Health Organization

Dr. Abbas Ostadtaghizadeh,

Director of Disaster Health Department,

Tehran University of Medical Sciences

Dr. Shina Ansari,

General Director of Environment and Sustainable Development at Municipality of Tehran

Mr. Seyed Ali Seyedzadeh,

Director General, Public Relations of Iran Water and Sewerage Engineering Company

I would like to thank Dr. Sabbaghpour, the International Deputy of Tehran Municipality, and his colleagues and all the colleagues who helped us in carrying out this program.

Congratulations on, *World Science Day* for *Peace and Development*

The Iranian Science Popularization Association is a Non-governmental organization that was established on May 6, 2001 with the aim of popularization of science among the general public, disseminating scientific thinking in order to create a suitable environment for the popularization of science in society, coordination between science popularizing, science and institutional promoters. The popularization of science in society has been created with the permission of the Commission of Scientific Associations of the Ministry of Science, Research and Technology. With 20 years of experience, the association has carried out many activities, including holding twenty science popularizing awards, the ninth week of science popularization, conferences, workshops, lectures, scientific meetings, science popularization magazines, book publishing, and so on. Since 2012, the Science Popularization Association has been holding Science Popularization Week on November 10, coinciding with the World Science Day in for Peace and Development, with the aim of spreading scientific thinking and the relationship between science and society. In holding this annual event, some domestic and international scientific and cultural organizations and institutions, including the UNESCO Regional Office, have cooperated with the Association. This year we are holding the ninth year of science popularization week in Iran. This year we have expanded the programs from one week to about 40 days. Some of these programs are as follows. On November 10, the opening ceremony and commemoration of the World Science Day for peace and development was held. Today, the Covid 19 workshop and the water consumption pattern will be held and a special name has been chosen for each day of the week. Subject of Scientific Associations and Science

Popularization, Monday Culture of Science and Research, Introduction of Extension Activities in the Field of Agriculture, Tuesday Popularization of Science in Universities and Scientific Centers, Wednesday Health and Science Popularization, Thursday Media and Science Popularization, Since yesterday, other institutions have applied to the association to add extension programs during this period, such as museums and science popularization. This issue shows the existing scientific capacities in the country. As you can see, the title that UNESCO has chosen for this day this year is science for society and with society. We are proud that the association's programs have been to achieve this important goal since its inception. We are pleased that the association is working on global programs. Regardless of all the efforts and progress that have been made in the field of deepening the relationship between society and science, or perhaps it is better to say that science has been done with society, but there is still a need for more activities in this field. This week, it is reminded again that "society without science" and "science without society" have no meaning, society is a bedrock for the flourishing of science and science is also a reality for improving the lives of people. Therefore; the title of science for society and with society is a drawing of what we believe in and we try to turn it from a slogan into a daily reality of Iranians' lives. In order to increase and establish a systematic relationship between science and society to achieve a science popularization ecosystem, we propose the establishment of a science popularization secretariat in the country. To plan weekly programs, especially joint programs with Ms. Mehrdadi's regional office, they said that one of the cases of joint cooperation is the issue of water. In the meeting we had with Dr. Hejazi, the vice president of the association, regarding the crisis of Covid 19 and the way of water consumption, we proposed the subject of Covid 19 and the pattern of water consumption to the regional office, which was welcomed. I am glad that this important issue will be addressed with the presence of domestic and foreign professors and experts. The purpose of this workshop is:

Represent the importance of proper use of water resources

Awareness of the community and promoting the correct use of water

Creating a culture and trying to improve the pattern of water consumption

Water consumption management

I leave the talk in this field to the experts and experts in this field. Given that one of the solutions to this problem is culture and generalization. The Iranian Science

Popularization Association considers this workshop as a start to draw public attention to this important issue. And declares its readiness to continue such workshops with the participation of domestic and international experts. At the end, again from all the organizations, institutions, colleagues, friends and companions who helped us in holding programs from Science Popularization Week to Research Week.

COVID-19 and Water Consumption Pattern

Dr. Alexandros K. Makarigakis; Programme Specialist Water for Human Settlements of the Future Division of Water Sciences

SESSION 1 : IMPACT

Direct & Indirect Impact on Water Resources and Water System?
Most Challenging Part?

Statistics on Resource Pressure
Change of water consumption?
Change of people's behavious of using service?

Vulnerable Group
Who are they?
How they are related?

Service Disruption
Water supply and sanitation
watewater Treatment

Sustainble Development
Role of "access to safe water" to play in the pandemic?

Research
Virus transmission through water/wastewater?

SESSION 2 : REACTION

Particular Strategy for Protection, Prevention, and Preparation
in Water and Wastewater Management and Service?

Trans-sectoral Responce
Sectoral action to cooperate?
A new communication process?
Coordinative mechanism?

Finance & Resource
Cost on maintain the operation?
How is the action effectively suppprted?

Technology & Tool
New technologies, tools and methods applied to facilitate this overall reaction?

Action Remained as Legacy
Practices or measures at the Post-COVID Era
What are the unique benefits?

SESSION 3 : LESSON

What are the most essential lesson for the Future
for developing responsive and adaptive approach to water crisis?

Emerging Opprtunity
Open science education, technology and digitalization for water stakeholders?

Global Cooperation
Cooperation among different megacities to tackle water crisis with global urgency?

Service & System Improvement
Re-think and improve work normality, water project planning, implementation and monitor?

Multi-lateral Governance & Management
Democratize global multi-lateral governance with public, private partners, and citizen participation?

Scientific Monitor
Monitor of global water crisis for better observation, forecast and prediction?

1. Key observation on Water Consumption

- ❑ Lock-down policy and restriction in **business and production sector** has reduced the overall water demand in business, whereas water consumption has increased in **residential scenario**.
  - In Jakarta, the water demand of the industry and commercial sector decreased by 23% up to 34% compared to the pre-COVID-19 situation, while most of the domestic use has increased to 11%.
  - The growth in household water consumption was observed 30% in Istanbul, 20% in Lima and in Karachi, as well as 5% in Tehran in the early months.
- ❑ Enforced by the risk reaction policy, **priority was given to maintain undisrupted water supply for the citizens**.
  - Megacities such as Istanbul, Mumbai, Lima and Wuhan were still able to manage the normal water demand and supply

■ COVID-19 Pandemic **aggravated the already insufficient capability of water utilities** to meet the water demand and fill water shortage.

- In Mexico City and Lagos, the water pressure occurred, which placed challenged water facilities and operation as well as occasional facilities;
- Karachi faced a 35% shortage of water supply as the result of non-revenue water loss (45%) and water pollution;
- In Tehran, short-term water shortage occurred due to the high temperature in June 2020.

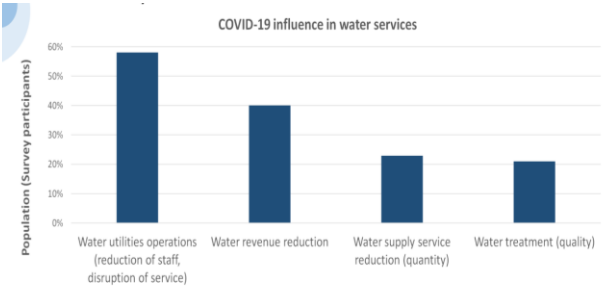
- ❑ COVID-19 Pandemic particularly **necessitated the specific reaction on water provision to vulnerable communities**, where the water service was already in deficit.
  - In Mexico City, over 125,000 people have no access to grid water in the household;
  - In Jakarta, 37% of the population is not connected with piped water;
  - 0.8 out of 10 million inhabitants in **Lima** are supplied with water trucks instead of piped water.
  - In Karachi and Sao Paulo**,** water service to slums and informal settlements were the most affected

2. Other Highlights for Megacities' Response

- **Immediate actions to meet the urgent water access demand in low-income communities and informal settlements**
  - ➢ Jakarta (Indonesia): **Water kiosks** and **hand washing stations**
  - ➢ Lima (Peru): **Water trucks** for 0.8 million affected people to avoid service disruption

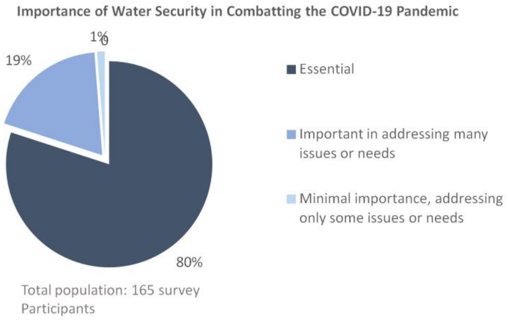
- **Massive restriction on industrial and commercial sector**
    - **Significant decrease in water related revenues**, for instance in Cairo (Egypt) and Mexico City
    - **Financial solutions** proposed to operators and utilities Karachi (Pakistan), supported 60% of the water utility's operational costs
- **Leading role of scientists in combating COVID-19**
    - Specific **disinfection** and **monitoring** in water supply and wastewater treatment plants in Istanbul (Turkey) and Wuhan (China)
- **Sector-to-sector communication and cooperation**
    - As mentioned by Tehran (Iran) **working together** at different **levels (federal, state, municipalities)** is crucial to achieve cooperation between diverse **institutions** linked to water services and management and to **adapt** the pandemic **strategy properly** to the diverse population groups.

3. Interactive Survey

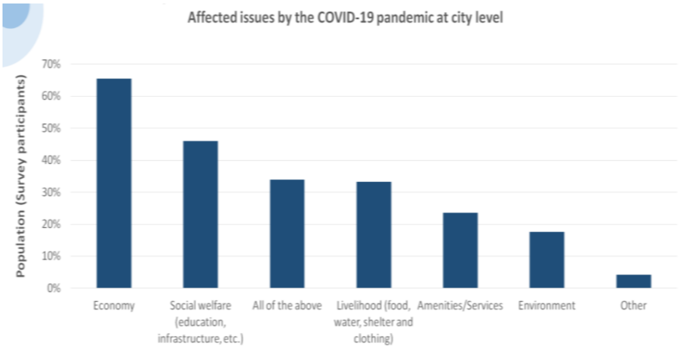


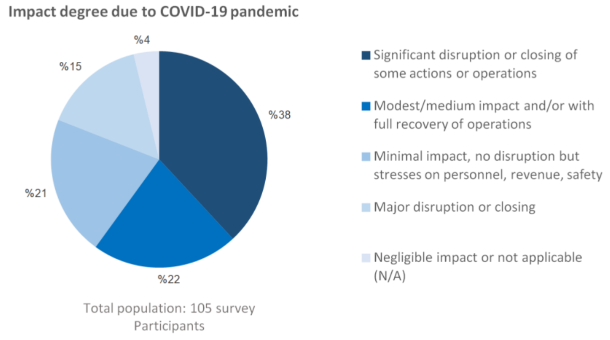
Actions taken are manifested by staff virtual working (64 out of 105 participants), and increase in sanitary and safety measures by the operators (58/105) (Graphic 6)

Accoridng to the participants two major themes for future water management strategies are the integration of public health (74 %), and addressing the most vulnerbale groups through infrastructure and water services implementation (69 %) (Graphic 7).

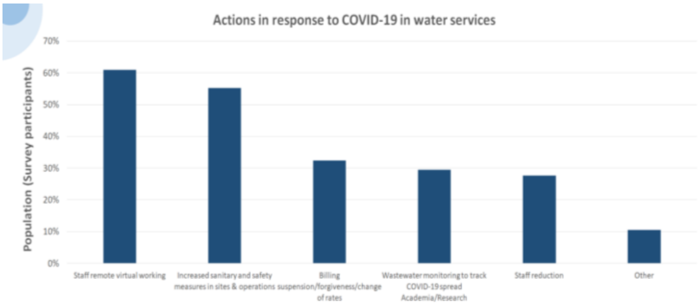


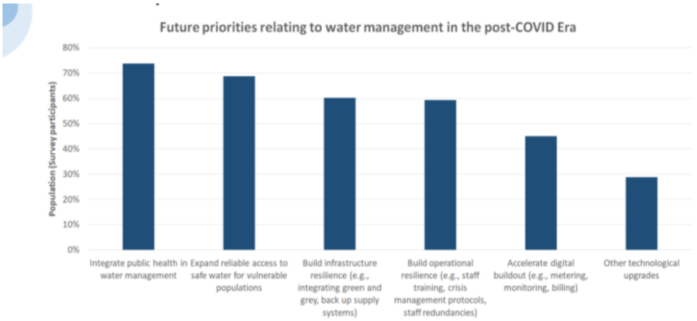
About 57% of the survey participants are from the educational (23%) and research sector (15%) alongside government agancies (19%) (Graphic 1)
132 out of the 165 people consider that water security is essential to combat the pandemic (Graphic 2)
From the perspective of 165 survey participants, the major area of impact is the economy (65%), followed by the social welfare (46%). Nevertheless, 34% considered that all of the mentioned issues are affected by the pandemic (Graphic 3)





The majority of the survey population perceived from a significant to modest disruption in their working activities due to the pandemic (Graphic 4). On the other hand, major influence in water services was apparent in water utilities and operations (60%). Comparatively, the impact was less noticed in the water supply (23%) and treatment (21%) (Graphic 5).





Messages from UN on COVID-19

- It is emphasized that the urban inequalities and long-term development deficits, especially the vital access to water and sanitation, and necessitated the strengthen capacities of local government.
- An estimated 71 million people are expected to be pushed back into extreme poverty in 2020, the first rise in global poverty since 1998.
- Underemployment and unemployment due to the crisis mean some 1.6 billion already vulnerable workers in the informal economy.
- More than one billion slum dwellers worldwide are acutely at risk from the effects of COVID-19, suffering from a lack of adequate housing, no running water at home, shared toilets, little or no waste management systems, overcrowded public transport and limited access to formal health care facilities.
- Climate change is still occurring much faster than anticipated. The year 2019 was the second warmest on record and the end of the warmest decade of 2010 to 2019.

Water Importance and Demand in COVID-19 Pandemic Era

Prof. Simin Nasseri; Deputy for Research, School of Public Health; Dean, Center for Water Quality Research (CWQR); Institute for Environmental Research (IER); Tehran University of Medical Sciences (TUMS); Head, Environment Group, Iran Academy of Sciences

Water as a human right

Without water, our lifespan would be around 14 days!

Only **2.5%** of the water on earth is **fresh water** and only **0.1%** is **accessible** to humans

Forecasts saying that **47 % of the world population** is going to experience **water scarcity** by 2030

This is the reason why in 2010 the UN officially recognized **access to safe drinking** water as a **basic and universal human right**.

Water, Sanitation & Hygiene (WASH) and COVID-19

Safely managed water, sanitation, and hygiene (WASH) services are an essential part of preventing and protecting human health during infectious disease outbreaks, including the current COVID-19 pandemic.

WASH and COVID-19

Ensuring good and consistently applied WASH and waste management practices in:

- Communities,
- Homes;
- Schools;
- Marketplaces;
- Prisons and;
- Health care facilities.

Hand hygiene

- Hand hygiene is extremely important to prevent the spread of the virus.
- Hand hygiene also interrupts transmission of other viruses and bacteria causing common colds, flu and pneumonia, thus reduces the general burden of disease.

COVID-19 economic impacts

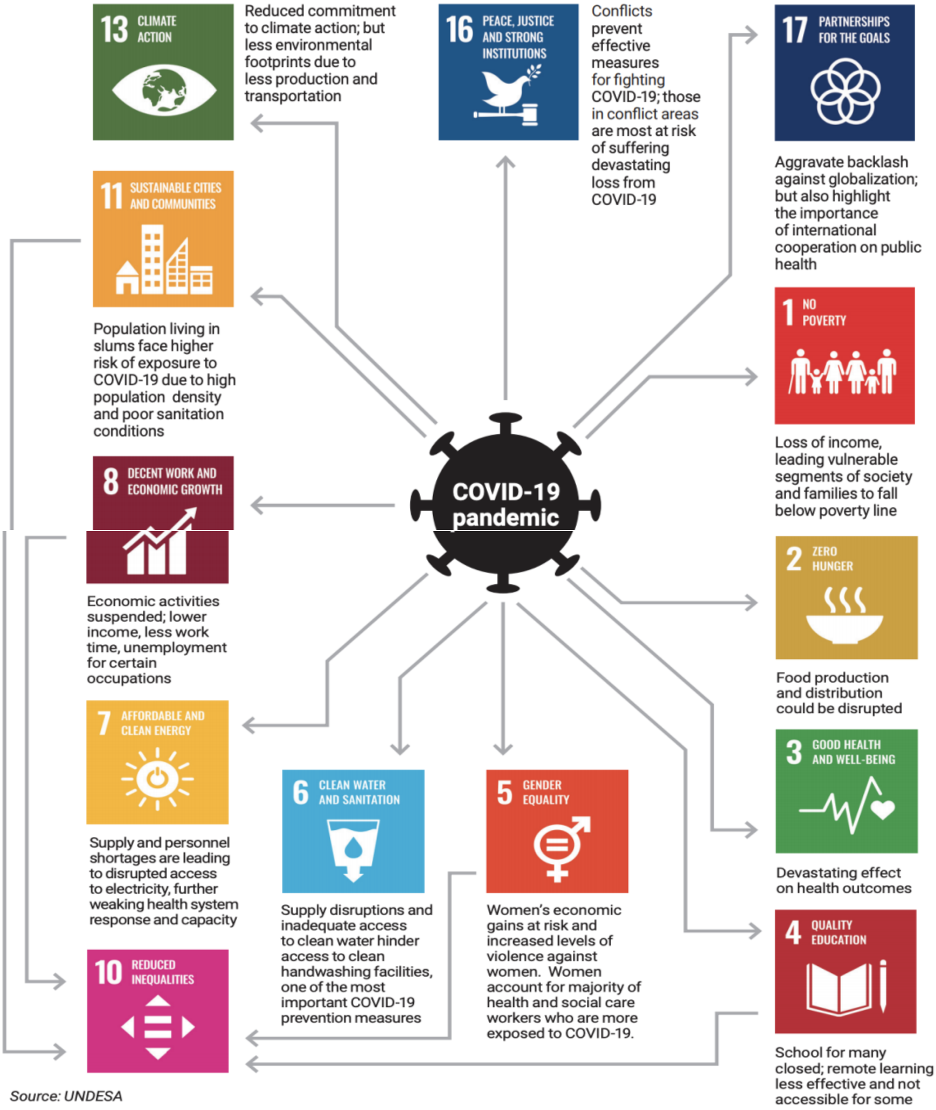
The economic impacts of the virus are projected to force an additional 40 million to 500 million people into poverty.

According to International Monetary Fund (IMF) the cumulative loss to global GDP over 2020 and 2021 could be about US$9 trillion, greater than the combined economies of Japan and Germany.

SDGs as a roadmap to recovery from COVID-19

The SDGs has offered an integrated perspective to combat COVID-19.

COVID-19 should not be an excuse to delay action, but rather reason to accelerate action on the SDGs.



Reduced commitment to climate action; but less environmental footprints due to less production and transportation

Conflicts prevent effective measures for fighting COVID-19; those in conflict areas are most at risk of suffering devastating loss from COVID-19

Aggravate backlash against globalization; but also highlight the importance of international cooperation on public health

Population living in slums face higher risk of exposure to COVID-19 due to high population density and poor sanitation conditions

Loss of income, leading vulnerable segments of society and families to fall below poverty line

Economic activities suspended; lower income, less work time, unemployment for certain occupations

Food production and distribution could be disrupted

Supply and personnel shortages are leading to disrupted access to electricity, further weaking health system response and capacity

Supply disruptions and inadequate access to clean water hinder access to clean handwashing facilities, one of the most important COVID-19 prevention measures

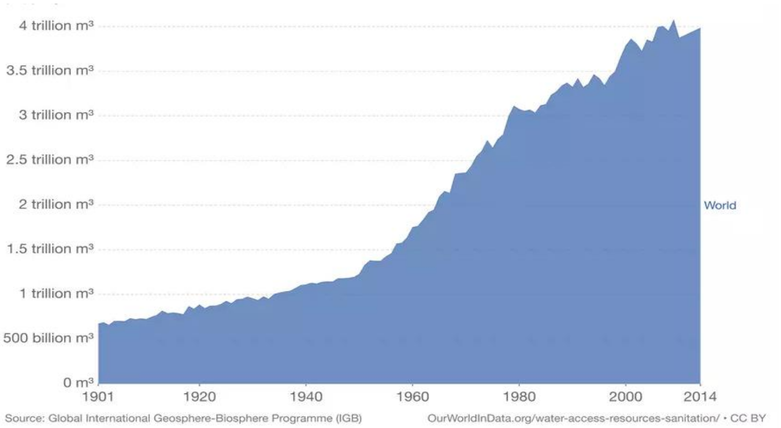
Women's economic gains at risk and increased levels of violence against women. Women account for majority of health and social care workers who are more exposed to COVID-19.

Devastating effect on health outcomes

School for many closed; remote learning less effective and not accessible for some

Source: UNDESA

Global freshwater use over the long-run Global water use has increased by a factor of six
- Up to 70%: irrigation
- 30%: industry and domestic use.



Changes in Water Demand

1. The COVID-19 pandemic has imposed massive health and economic burdens on communities around the world, and no sector of society is going untouched, including the vitally important water sector.
2. One area that has come to the fore is the effect on municipal water demand.
3. Available data indicate that residential water demand has increased while non-residential demand has decreased.
4. In Portsmouth, England, for example, residential demand increased by 15 percent during the lockdown, while non-residential demand declined by 17 percent. Likewise, in San Francisco, California, residential demand increased by 10 percent, while non-residential demand declined by 32 percent.

Water consumption in Iran

The amount of drinking water consumption in the first week of spring in Iran was about 145 million cubic meters, around 40% increase compared to the same period in last year.

The consumption pattern was not so stable and due adaptation, the consumption was gradually became more balanced in many provinces of the country.
Every year in Tehran, capital of Iran, we normally have about 2.5% growth in the consumption, which is almost proportional to population growth, but during

recent 7 months this figure has reached around 10.1% (7.5% more than normal) which is due to the prevalence of COVID-19 and more hand washing practices.

Mitigation of secondary impacts of COVID-19

Safely managed WASH services are critical during the recovery phase of a disease outbreak to mitigate secondary impacts.

Secondary impacts include:

Disruptions to supply chains (water, sanitation, ...)

Inability to pay bills

Negative impacts on the continuity and quality of services

Inability of schools, workplaces and other public spaces to maintain effective hygiene.

If not managed, secondary impacts can increase the risk of further disease spreading.

Priority Areas

The priority areas in the WASH sector:

- Regarding the importance of safe drinking water, water resources management is now very important.
- Quantification of the presence of virus in raw and treated wastewaters is essential.
- Conducting training workshops for virus detection like PCR and Rt-PCR techniques
- Performance assessment of water and wastewater treatment plants
- Fostering Sanitation Safety Planning (SSP) and Water Safety Plan (WSP) programs for risk assessment
- Provision of financial supports

Actions taken in Iran

In Iran, we (CWQR (IER) and School of Public Health, TUMS) are: Providing necessary scientific information about COVID-19.

Provision of disinfection technologies to ensure that drinking water is clean and safe.

Monitoring wastewater treatment plant processes for reduction of virus.

The fist conducted study to monitor SARS-Cov-2 in wastewaters in Iran (March, 2020)

The goal was:

To study the presence of SARS-Cov-2 in inlets (raw municipal wastewater) and outlets (treated municipal wastewater) of wastewater Treatment Plants (WWTPs) in three epicenters of Iran: Tehran, Qom and Anzali.

Positive results of virus detection in the wastewater.

Recently undertaken another study Title:

An investigation on the occurrence of COVID-19 disease virus in water treatment and distribution and wastewater collection and treatment systems in different cities of Iran

Basic Aims:

Quantification of SARS-CoV-2 in inlet and outlet of wastewater treatment plants in terms of gene copy/liter

Determination of wastewater treatment plants performance

Topics for further studies in Iran

WASTEWATER-BASED EPIDEMIOLOGY (WBE): providing rapid, inexpensive mass surveys.

QUANTIFICATION OF THE MAGNITUDE OF EXPOSURE: Using Quantitative Microbial Risk Assessment (QMRA)

DISINFECTION TECHNOLOGIES: the assessment of chemical and non-chemical disinfection processes

Fostering link between policy and projects

Actions to be taken:

- ✓ Developing a stronger research environment for WASH;
- ✓ Adding more focus on matters of concern like WASH vs. COVID-19;
- ✓ Conducting research aimed at enabling better regional policy;
- ✓ Outcomes;
- ✓ Developing a stronger regional policy foundation;
- ✓ Enhancing collective regional awareness.

COVID-19 IMPACT ON WATER CONSUMPTION IN JAKARTA; PRIYATNO BAMBANG HERNOWO
PAM JAYA

BASIC FACT

- Population 10,6 million (2019)
- Area: 662,3 km^2 (255,7 sq. m)
- Density: 16,262/km^2
- Consist of 5 administrative cities/municipalities (Central, North, South, East and West) + 1 administrative regency (Seribu Islands)

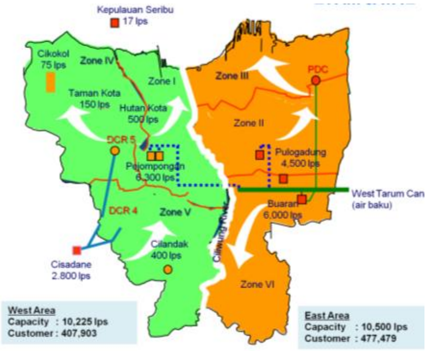
WATER SUPPLY PROVISION IN JAKARTA

PAM JAYA is a regional-owned enterprise responsible for the water supply provision in Jakarta

As of Sep 2020

Total production capacity 20,742 liter/second

Total customers 887,314

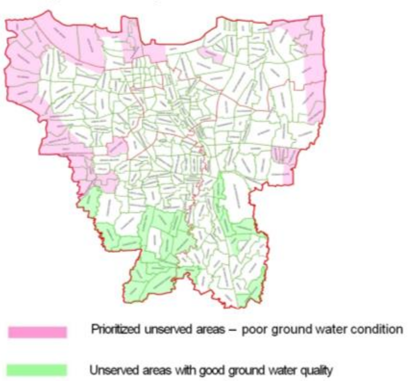


CHALLENGES

Only 64% of population is covered by piped connection

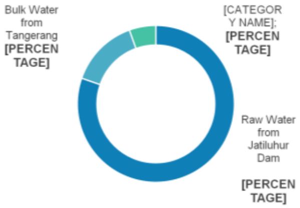
Others rely on ground water extraction (causing land subsidence issue especially in North Jakarta), water vendor or bottled water.

100% coverage ratio is targeted in 2030.

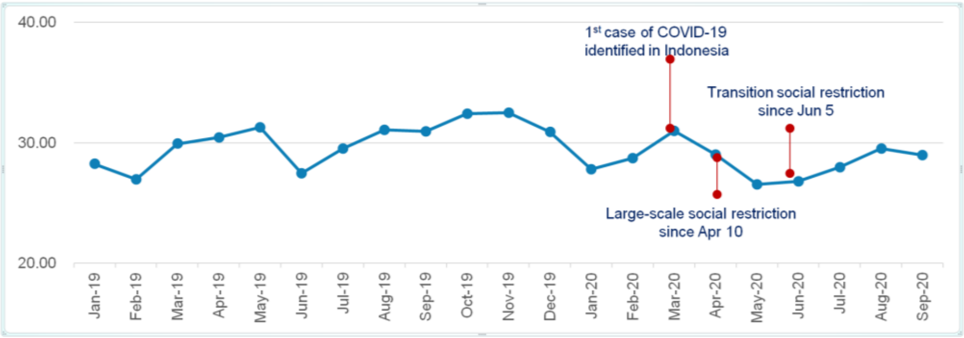


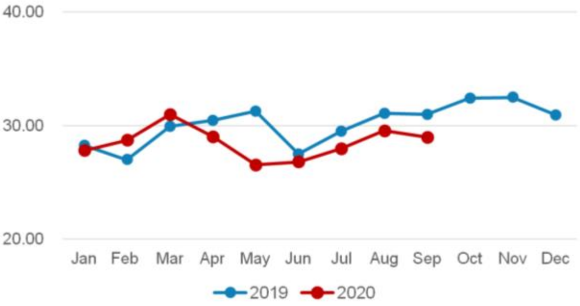
Only 6% of water supply is from internal Jakarta

Although there are 13 rivers that run through Jakarta, most of them can’t be utilized as water source due to poor quality and unreliable supply



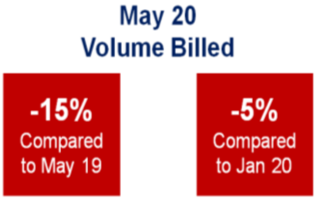
CONSUMPTION TREND DURING PANDEMIC
Volume Billed (mio m3)





The implementation of large-scale social restriction measure by Jakarta provincial government affected water consumption as most public and commercial activities were halted

As the measure took full effect in Apr and May 2020, May 20 has been the lowest water consumption billed


May 20
Volume Billed

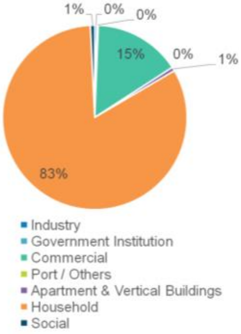
-15%
Compared
to May 19

-5%
Compared
to Jan 20

The transition social restriction measure gradually increased volume consumption as more activities are resumed:
Offices are opened with shift, limited commercial activities are gradually allowed

CONSUMPTION TREND DURING PANDEMIC

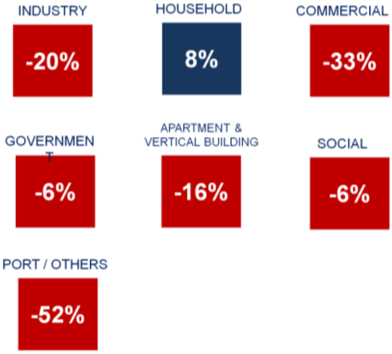
Customer by Segment



83% of customers are in household segment, 15% are in commercial segment
Other segments contribute to not more than 1% of customers

Comparison of Volume Billed:

Jan 2020 vs. May 2020


INDUSTRY
-20%

HOUSEHOLD
8%

COMMERCIAL
-33%

GOVERNMENT
-6%

APARTMENT & VERTICAL BUILDING
-16%

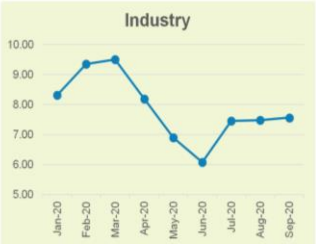
SOCIAL
-6%

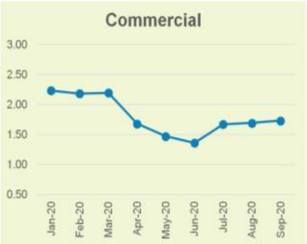
PORT / OTHERS
-52%

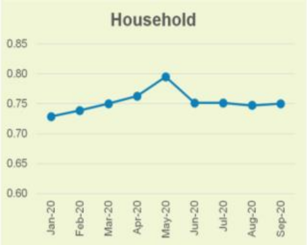
Only volume consumption in household segment increased during the implementation large-scale social restriction

Port and commercial segments have been affected the most in terms of volume consumption

CONSUMPTION TREND DURING PANDEMIC
Average Daily Consumption (m3/cust./day)

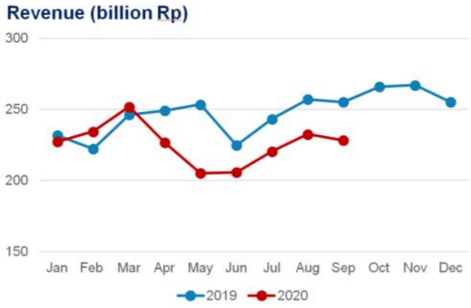






- Average daily consumption for industry and commercial customers decreased during large-scale social restriction period due to the closing/ limitation of industry and commercial activities
- On the contrary, the average daily consumption for household connections increased as people spent more time at home
- Transition social restriction has gradually stabilized the average daily consumption

CONSUMPTION TREND DURING PANDEMIC



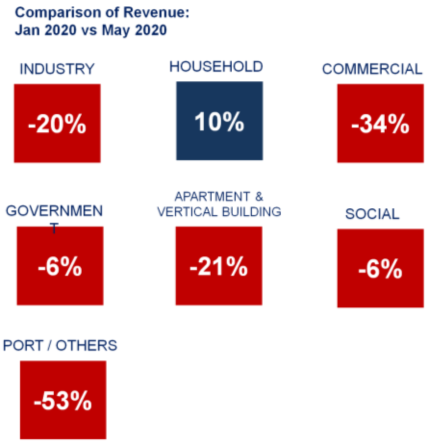
May 20
Revenue

-19%
Compared
to May 19

-10%
Compared
to Jan 20

Decrease in volume consumption and shifting in consumption pattern (lower volume contribution of customers with higher water tariff) resulted in lower revenue

CONSUMPTION TREND DURING PANDEMIC



Comparison of Revenue:
Jan 2020 vs May 2020

INDUSTRY
-20%

HOUSEHOLD
10%

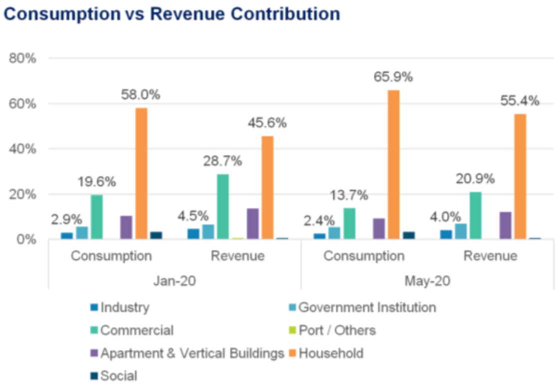
COMMERCIAL
-34%

GOVERNMENT
-6%

APARTMENT & VERTICAL BUILDING
-21%

SOCIAL
-6%

PORT / OTHERS
-53%



COVID-19 IMPACTS

Lack/limited access to safe water


shutterstock.com • 1442830001

- 36% of Jakarta population have no access to improved source through pipe household connection, especially in highly dense communities with no water alternatives
- More time or money spent to collect water through public taps or water vendor

Difficult to practice good hygiene

People may decide handwashing is not a priority if water is not readily available, or if it is available at a higher cost

Decrease in commercial water usage

- Full & transitional large-scale social restriction has been implemented in Jakarta since Apr 10
- Reduced industrial and commercial activities resulting in decrease in water usage by those customers
- As people work and study from home, more water is consumed by residential customers

Potential lost revenue as water tariff for industry and commercial is higher than for residential customers

Slow down investment projects

- Projects to increase service coverage and secure water supply reliability were planned to be funded through government capital participation
- Government budget contraction affected investment plan

Potential delay in achieving 100% service coverage in 2030
Water utility should seek alternative financing schemes

COVID-19 AFTERMATH – LESSON LEARNED

Good hygiene practice (frequent and proper handwashing) is the new norm

- Handwashing facilities should be made available in residential areas as well as in public places
- Accelerate access to safe and affordable basic water service, especially in informal or densely populated settlements and in rural areas

Adjustment in workforce and operational activities

- Optimizing and developing automated system in production, distribution processes
- Improvement in customer service process towards online/ contactless system
- Minimum workforce operation

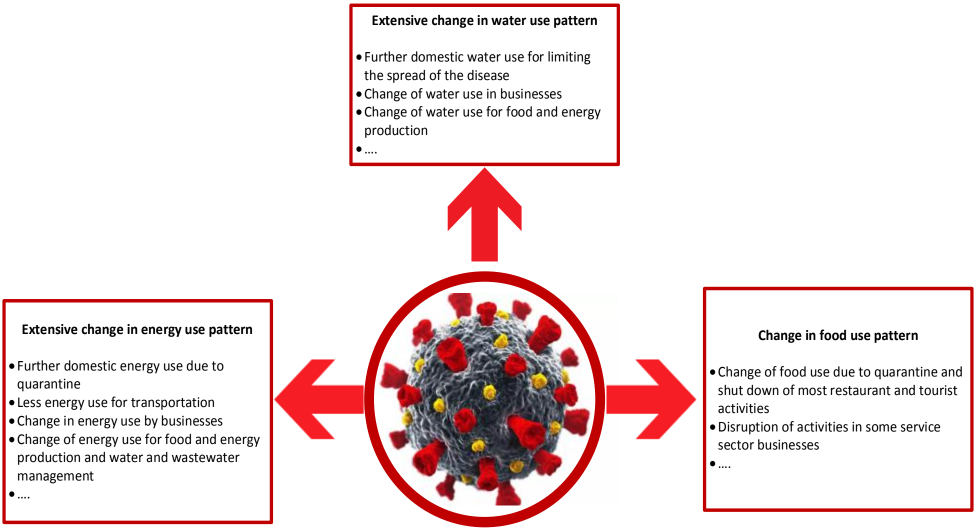
Towards resilient water supply provision

- Ensuring the availability of raw /bulk water supply through the construction of water treatment plants to increase access to clean water
- Development of Water Safety Plan from source to tap to ensure the security and reliability of water supply system
- Development of Business Continuity Plan to prepare and improve the capabilities of water utilities in dealing with crisis
- Promote collaboration with governments, institutions and other parties during and after emergency as part of Business Continuity Plan

Lessons learned for water resources planning and management COVID-19 Pandemic

Dr. Banafsheh Zahraei; Associate Professor, University of Tehran and Secretary of the National Working Group on Adaptation to Dehydration

First of all, I would like to thank the Iranian Association for Popularization of Science and the UNESCO Tehran Cluster Office for holding this workshop. Covid 19 has many effects on water consumption. Especially during quarantine times and to comply with health protocols, water consumption has multiplied. As shown in the figure below, the Covid 19 pandemic has not only had a significant impact on water consumption, it has also changed the state of food and energy consumption, which in turn has had a significant impact on water consumption.



Extensive change in water use pattern

- Further domestic water use for limiting the spread of the disease
- Change of water use in businesses
- Change of water use for food and energy production
- ....

Extensive change in energy use pattern

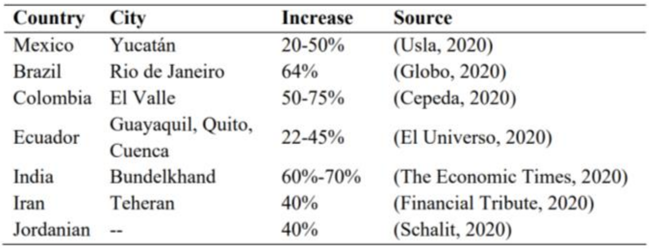
- Further domestic energy use due to quarantine
- Less energy use for transportation
- Change in energy use by businesses
- Change of energy use for food and energy production and water and wastewater management
- ....

Change in food use pattern

- Change of food use due to quarantine and shut down of most restaurant and tourist activities
- Disruption of activities in some service sector businesses
- ....

The table below shows the increase in water consumption of some of the world's major cities due to the Covid 19 pandemic. As you see in the table, in these urban communities, water consumption has increased from 20 to 70%.

Table 1. Increase in water demand in several countries.



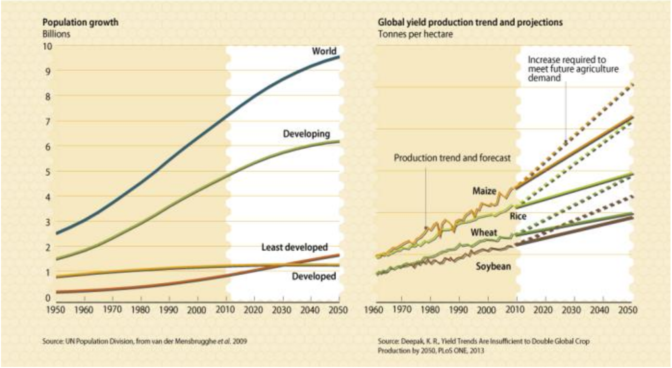
Country	City	Increase	Source
Mexico	Yucatán	20-50%	(Usla, 2020)
Brazil	Rio de Janeiro	64%	(Globo, 2020)
Colombia	El Valle	50-75%	(Cepeda, 2020)
Ecuador	Guayaquil, Quito, Cuenca	22-45%	(El Universo, 2020)
India	Bundelkhand	60%-70%	(The Economic Times, 2020)
Iran	Teheran	40%	(Financial Tribute, 2020)
Jordanian	--	40%	(Schalit, 2020)

The service sector has also change in many areas due to the pandemic. The disease has affected the production and consumption of water, food and energy resources in many service sectors, while according to statistics, energy consumption during the quarantine period in the public transport sector decreased and in the personal vehicle and household sectors has increased significantly. All of this has completely affected water and energy consumption. There have been changes in energy consumption by various businesses and water and food systems.

A case study in China shows that during quarantine, household energy consumption in the surveyed areas more than doubled. People's diets have changed, especially during the quarantine period, and so have the various activities connected with food production and distribution. Another case study conducted in Italy showed that the disease also affected household diets, with some households consuming several times more and others consuming many times less. Therefore, due to the interdependence between water, food and energy systems, these systems cannot be considered separately to investigate the effect of Covid 19 pandemic conditions on water resources.

It is predicted that by 2050, the world's population will reach 9 billion & 600, more than half of this population will live in developing countries and more in cities, and this urban population will have a higher standard of living and They will have a higher per capita income and will certainly have different needs for water, food and energy. In the chart below, you can see what the changes in the production of major agricultural products have been like until 2010 and how they should increase in order to feed this growing population.

Will there be enough food for 9.6 billion people?

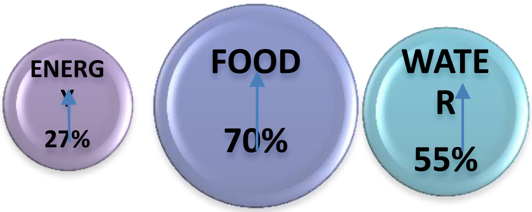


Source: UN Population Division, from van der Mensbrugghe *et al.* 2009

Source: Deepak, K. R., Yield Trends Are Insufficient to Double Global Crop Production by 2050, PLoS ONE, 2013

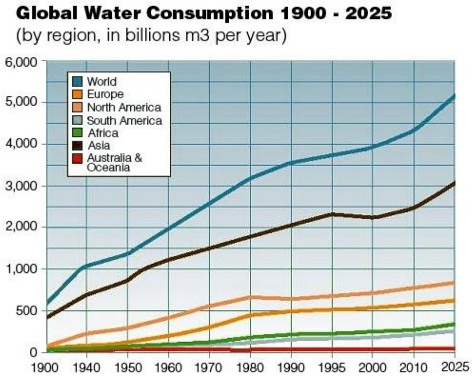
We have had the same changes worldwide in the process of energy and water consumption. The chart below shows the forecast of energy consumption until 2050, which shows the trend of linear increase, and the main trend of this increase is in Asia, and energy consumption will more than double.

WFE Demands: 2050 Outlook



1. World Energy Outlook 2018 by the International Energy Agency
2. OECD
3. FAO

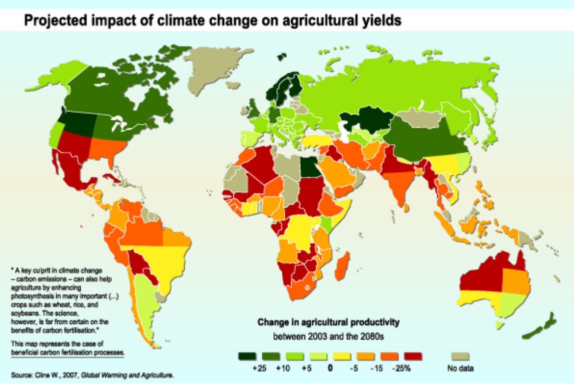
Water consumption is also growing very fast and it is expected that by 2025, per capita water consumption in various countries and on the planet will reach more than 5,000 billion cubic meters, which is shown in the figure below.



Global Water Consumption 1900 - 2025

(by region, in billions m3 per year)

Special events, such as the Covid pandemic and the fact that it has been going on for a long time, strongly affect these trends, and some of these effects take the form of changing habits, lifestyle changes, changing different businesses It will occur, and after the onset of Covid 19 disease, these necessary changes in life and work will not return to normal. By 2025, it is projected to increase by 27% in the energy sector, 55% in the water sector and 70% in the food sector. These predictions were not made under the conditions of the Covid 19 epidemic. On the one hand, food production is one of the sources of water consumption; on the other hand, there is the phenomenon of climate change. It is expected that under the influence of this phenomenon, the productivity of agricultural production will change significantly.



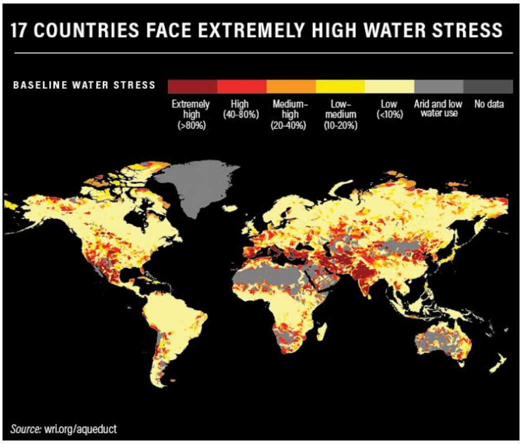
Projected impact of climate change on agricultural yields

" A key culprit in climate change – carbon emissions – can also help agriculture by enhancing photosynthesis in many important (...) crops such as wheat, rice, and soybeans. The science, however, is far from certain on the benefits of carbon fertilisation."

This map represents the case of beneficial carbon fertilisation processes.

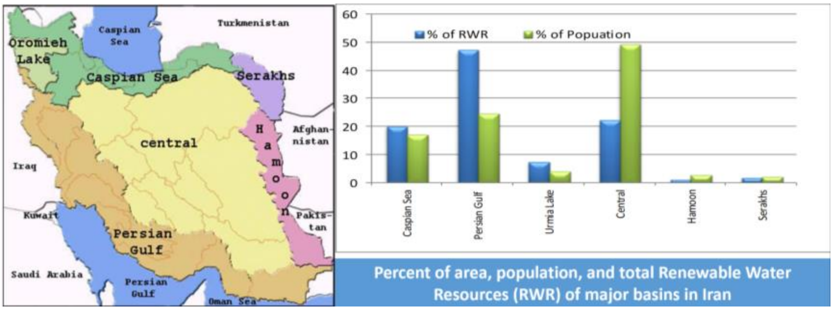
Source: Cline W., 2007, *Global Warming and Agriculture.*

In the chart above, most Middle Eastern countries are marked in orange and red. More than 25% reduction in agricultural production productivity by 2080 due to climate change in Iran and many Asian countries is predicted, which can be seen in the above map. These conditions, along with the increase in population consumption mentioned earlier, indicate the additional pressure that will occur on water resources in arid and semi-arid countries such as Iran. In the Middle East region, which also includes Iran, as shown in the map below, 12 of the 17 Middle Eastern countries in particular are under severe water stress, while water supply in these countries is normal even in normal conditions. It is related with difficulty. Water consumption increases in certain conditions, such as the Covid epidemic. According to the World Bank, the greatest economic damage from climate change is in the Middle East, which will lose 6 to 14 percent of GDP by 2050 as damage to the agricultural sector. The damage is significant.



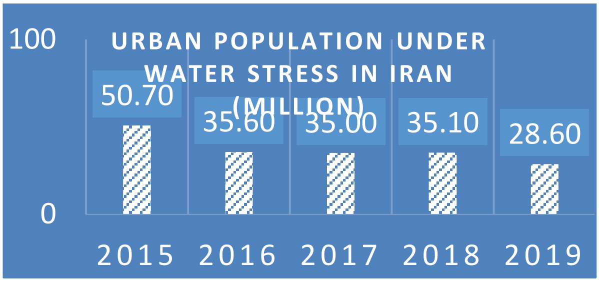
Source: wri.org/aqueduct

Each country has its own resources and uses. You can see the main catchments of Iran in the map below. In the catchment area of the Central Plateau, which covers a large part of the country in yellow on the map, nearly 50 percent of Iran's population is settled, while less than 25 percent of the country's renewable resources are located in the region. Conversely, in the Persian Gulf and Oman Sea basins, we have about 50% of renewable water resources, but less than 25% of the population lives there.

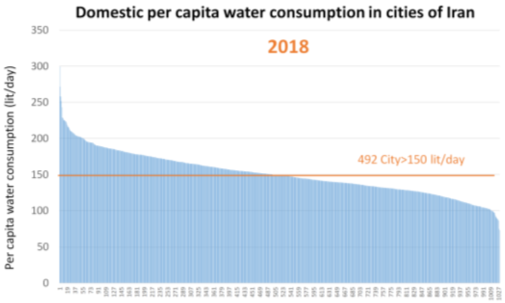


Percent of area, population, and total Renewable Water Resources (RWR) of major basins in Iran

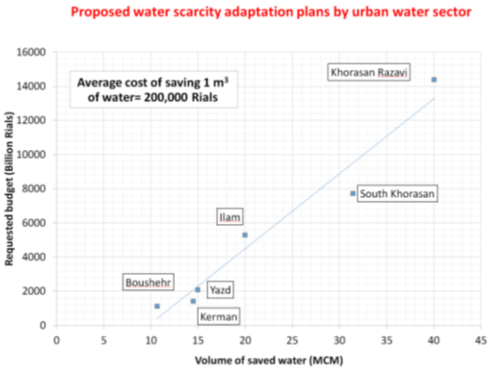
This indicates the heterogeneous distribution of the population with the country's water resources, which has led, as shown in the figure below, a large part of the urban population to be under water stress every year. This incompatibility of resources and costs will reduce the resilience of water supply systems in urban and rural settlements. By 2015, about 50 million people in Iran were under water stress, which increased to 28 to 35 million with increasing rainfall and efforts, but at least over 28 million people in Iran are always under water stress. This number indicates the high vulnerability of the drinking water supply system. Climate change and limited water resources are reasons why we need to increase investment to increase resilience. We have a very significant overdraft of groundwater reservoirs, which has reached 140 billion cubic meters of the country's cumulative reservoir, which in dry years is about 1.5 times the country's renewable water, while 83% of water supply Rural, 63% of industrial water and 57% of urban water are dependent on very unstable groundwater resources, both quantitatively and qualitatively, which are problematic even under normal circumstances.



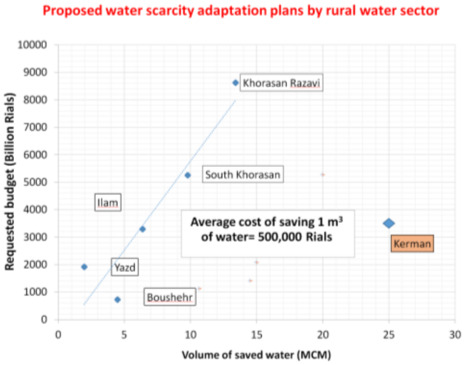
Water is 150 liters per person per day. For example, in 2018, out of about 1100 cities, 492 cities had a per capita consumption of more than 150 liters per person per day, which shows that all These quantitative and qualitative problems that we have regarding water resources, the country needs a solution to change the pattern and procedures of water consumption technically and culturally and in general to improve the pattern of water consumption.



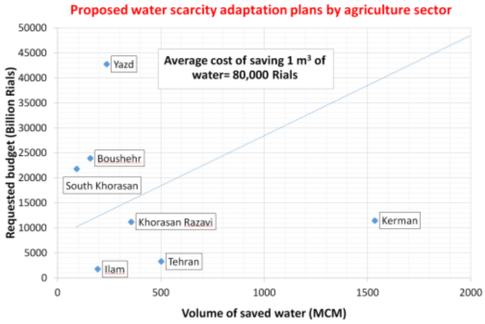
To address this situation, the government has sought to improve cross-sectoral coordination for water management. In this regard, a national working group on adaptation to water scarcity has been formed and government organizations and centers related to water consumption management or water protection are members of this working group. Since March 2017, it has tried to develop comprehensive and cross-sectoral programs for the protection and management of water resources to promote the sustainability of surface and groundwater. The most important achievements of this working group are: 1. Water shortage adaptation programs have been approved for 7 provinces of the country and are under consideration for other provinces; 2. Improving coordination between government agencies for proper planning and budgeting for water consumption, of which urban and rural water supply systems are an important part; 3. Raising awareness at the level of policy makers, managers and experts in various sectors about the physical and human causes of dehydration and what are the solutions to deal with it and how to reduce its negative effects; 4. In the programs of this working group, various projects have been proposed for proper management of water consumption and protection of water resources. In the urban sector in several provinces, you can see in the diagram that there is a linear relationship between the requested budget and the water saved. For every 200,000 tomans, one cubic meter in the urban sector must be saved.



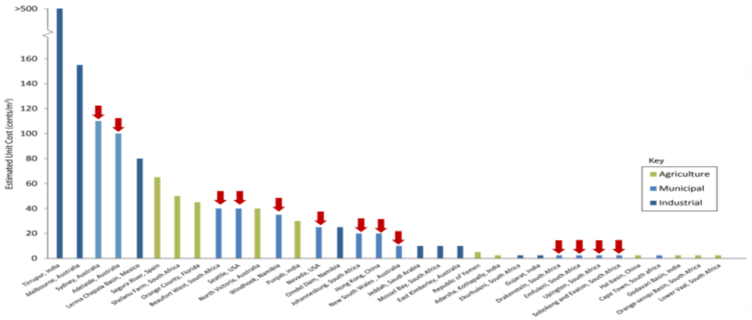
In the rural part, as shown in the figure below, this slope is steeper and an amount of about 50 thousand tomans is needed to save per cubic meter of water. This is a much larger number than urban water, so rural consumption and water supply systems are much more expensive.



In the agricultural sector, as can be seen, there is no clear relationship between savings and the required budget. Due to different technologies, different methods of irrigation and water consumption, different climates in different regions of the country are somewhat natural. On average, about 8 thousand tomans per cubic meter of water saving has been proposed in the working group's programs, which shows that when there is a budget limit, the policy-maker prefers to spend his capital somewhere. To be more effective, especially in the agricultural sector than the three sectors examined.



An examination of international examples, some of which are shown in the figure below, also shows how much investment should be made per cubic meter of savings in various sectors of agriculture and industry. As can be seen, there is a huge difference between the economic effectiveness of the experiences of different countries, which indicates the need for some kind of integration in planning to properly manage water consumption comprehensively. Water resources are often shared between these sectors, and in order for urban water resources to be sustainable, it is not necessary to invest in the urban sector, but it can be done in other sectors as well.



Source: 2030 WRG (2013), "Managing Water Use in Scarce Environments: A Catalogue of Case Studies" 2030 Water Resources Group, 2121 Pennsylvania Avenue, Washington D.C., 20433 USA.

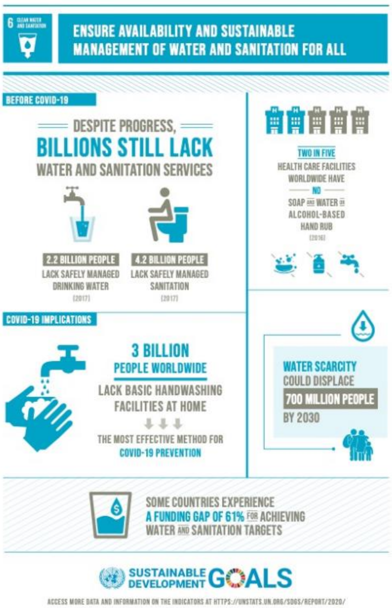
Then, a film was made in one of the universities of medical sciences in the country about how to properly wash the hands, which should be left open for one minute in order to overcome Covid 19 disease. Due to the fact that valves are usually not standard, such as these videos, people are taught that just to wash the hands properly, between 8 and 12 liters of water should be consumed each time the hands are washed. These are false teachings that are given in critical situations such as the Covid pandemic and can have serious consequences because these behaviors may later be institutionalized and persist. In conclusion, it can be said that in countries such as Iran, which have arid and semi-arid climatic conditions, the resilience of urban and rural drinking water supply systems is also inappropriate in normal conditions, and in special conditions such as Covid, Urban and rural drinking water systems impose a double burden, the necessary forecasts must be made, and in the context of limited financial resources in the country, it will be difficult to convince policymakers that the budget Limited companies should spend on urban and rural water supply because water consumption management solutions in urban and rural areas are costly and inefficient. It seems that the private sector can be more effective in promoting the sustainability of urban water supply systems, so it is necessary to identify ways for greater private sector participation to invest in this area.

WATER CRISIS: CORONA PANDEMIC AND AGGRAVATION OF ENVIRONMENTAL CRISES

Dr. Mona Khaleghi Rad

OUTLINE

Water: from weather to hand-wash, to drinking, to wasteWater Stress: scopes and breadth Water Management: from rural to urbanWater, Sanitation and Hygiene (WASH)Impact of climate change on waterCOVID-19: extra burden on water issues and other environmental issues Solutions (suggestions).



ENSURE AVAILABILITY AND SUSTAINABLE MANAGEMENT OF WATER AND SANITATION FOR ALL

BEFORE COVID-19

DESPITE PROGRESS, BILLIONS STILL LACK WATER AND SANITATION SERVICES

2.2 BILLION PEOPLE LACK SAFELY MANAGED DRINKING WATER (2017)

4.2 BILLION PEOPLE LACK SAFELY MANAGED SANITATION (2017)

TWO IN FIVE HEALTH CARE FACILITIES WORLDWIDE HAVE NO SOAP AND WATER OR ALCOHOL-BASED HAND RUB (2016)

COVID-19 IMPLICATIONS

3 BILLION PEOPLE WORLDWIDE LACK BASIC HANDWASHING FACILITIES AT HOME

THE MOST EFFECTIVE METHOD FOR COVID-19 PREVENTION

WATER SCARCITY COULD DISPLACE 700 MILLION PEOPLE BY 2030

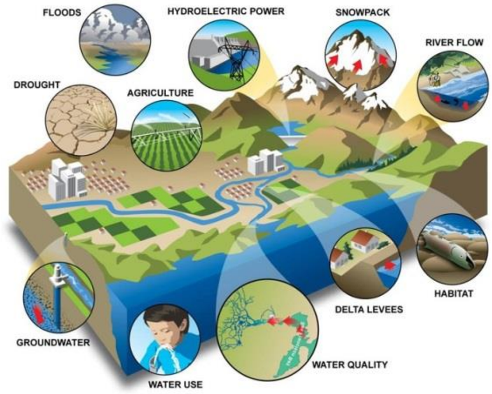
SOME COUNTRIES EXPERIENCE A FUNDING GAP OF 61% FOR ACHIEVING WATER AND SANITATION TARGETS

ACCESS MORE DATA AND INFORMATION ON THE INDICATORS AT HTTPS://UNSTATS.UN.ORG/SDGS/REPORT/2020/

https://www.un.org/sustainabledevelopment/wp-content/uploads/2019/07/E_Infographic_06.pdf

WATER: FROM WEATHER TO HAND-WASH, TO DRINKING, TO WASTE

- Flood (ground water contamination, water supply destruction, animal and human loss, water-borne diseases, etc.);
- Drought (water scarcity, desertification, migrations, crop and economic damage, conflict);
- Precipitation pattern change (crops and vegetation change, animal and vector reproduction and geographic change);
- Water misuse (wastewater and nutrition discharge to surface water bodies);
- Treated water waste (no reuse) Inefficient faucets and hand-washing habits (high marginal wastes);
- Ground water overuse (land subsidence);
- Dam building issues;
- Water supply leakages and inefficiencies.



WATER STRESS: SCOPES AND BREADTH

Water scarcity:

1. While nearly 70 percent of the world is covered by water, only 2.5 percent of it is fresh[1];
2. Around700 millionpeople in 43 countries suffer today from water scarcity;
3. By 2025,1.8 billionpeople will face absolute water scarcity, and $\frac{2}{3}$ of the world's population could be living under water stressed conditions;
4. With the existing climate change scenario, almosthalf the world's population will be living in areas of high water stress by 2030;

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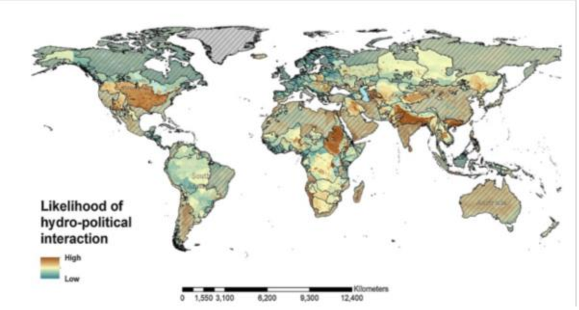
[1]. https://www.un.org/waterforlifedecade/scarcity.shtml

5. Water scarcity in some arid and semi-arid places will displace between 24 million and 700 million people;
6. 140+ million people may soon become “climate migrants,” due to floods, droughts, and water scarcity[2].

The water crisis is a health crisis[3]:

- Nearly 1 million people die each year from water, sanitation and hygiene-related diseases;
- Every 2 minutes a child dies from a water-related disease;
- 3 billion people globally –2 out of 5 –don’t have access to soap and water to wash their hands at home.



IRAN (AND TEHRAN)[4]

- High per capita consumption of treated water;
- Leakage of treated water in water pipe systems;
- Groundwater level decrease due to overuse (60 % irrigation is from groundwater);

Water stress index of over 78 %

- Land subsidence;
- Soil erosion;
- Desertification and land-use;

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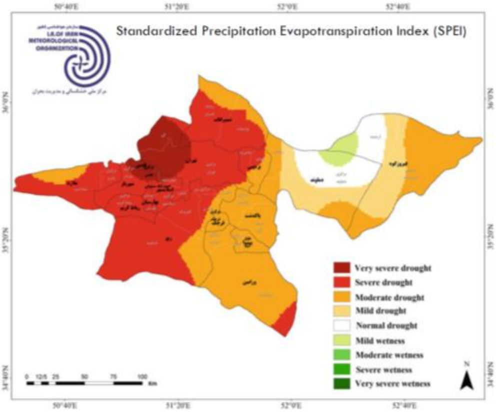
[2]. http://documents1.worldbank.org/curated/en/846391522306665751/pdf/124719-v2-PUB-PUBLIC-docdate-3-18-18WBG-ClimateChange-Final.pdf

[3]. https://water.org/our-impact/water-crisis/health-crisis/Farinosi, F., Giupponi, C., Reynaud, A., Ceccherini, G., Carmona-Moreno, C., De Roo, A. , ... & Bidoglio, G. (2018). An innovative approach to the assessment of hydro-political risk: A spatially explicit, data driven indicator of hydro-political issues.Global Environmental Change,52, 286-313

[3]. Ardalan, A., Rad, M. K., & Hadi, M. (2019). Urban water issues in the megacity of Tehran. InUrban Drought (pp. 263-288). Springer, Singapore.

- ➢ Change;
- ➢ Ecosystem damage;
- ➢ Fast urbanization;
- ➢ Forced migration and slums;
- ➢ Min and Max temperature increase;
- ➢ Wind speed decrease;
- ➢ Changes in the trend of precipitation.



WATER MANAGEMENT: FROM RURAL TO URBAN

Challenges:

Population growth in rural areas (Tehran had more than 500% population increase in 50 years with limited water resources (mainly deep-wells and qanats; groundwater removal))

Water Stress (high "withdrawals to availability ratio" (w.t.a)): Iran's w.t.ais 0.8 (severe stress)

Water consumption challenge (agriculture sector, even in Tehran!):

- ❖ 1 kg of wheat needs 1350 litres of water;
- ❖ 1 kg of rice needs 3000 litres of water;
- ❖ 1 kg of meat needs15,000 litres of water[5].

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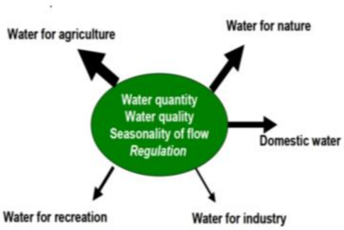
[5]. Ardalan, A., Rad, M. K., & Hadi, M. (2019). Urban water issues in the megacity of Tehran. InUrban Drought(pp. 263-288). Springer, Singapore



https://unfccc.int/files/national_reports/non-annex_i_natcom/application/pdf/ch_6_water_resources_rev1.pdf

WATER, SANITATION AND HYGIENE (WASH)

Based on WHO/ UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP) 2019 update on I.R. Iran (at household level)[6]:

- 91 percent of people have access to drinking water at safely managed level (94 % in Urban areas and 83% in Rural areas);
- 88 percent of people have access to sanitation at basic services level (92 % in Urban areas and 79% in Rural areas);
- No data on the hygiene.

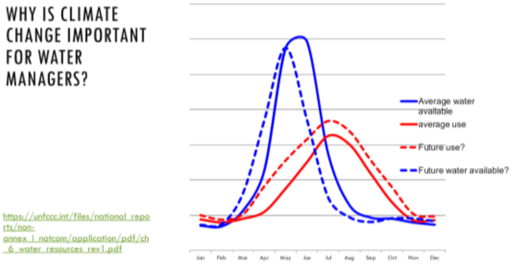
Risk factors: COVID-19 and drought

UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) report[7] on I.R Iran indicates that:

- National WASH policies exist on drinking-water, sanitation, and hygiene at both urban and rural levels;
- National target is to reach 72% of population with connection to sewer and safely managed services in urban areas and 3% in rural areas until 2020.

Risk factor: floods

WHY IS CLIMATE CHANGE IMPORTANT FOR WATER MANAGERS?



https://unfccc.int/files/national_reports/non-annex_i_natcom/application/pdf/ch_6_water_resources_rev1.pdf

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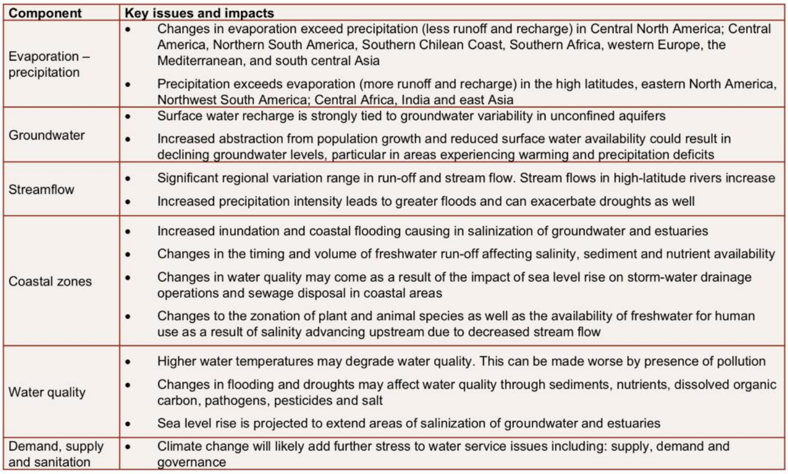
[6]. https://washdata.org/data/household#!/table?geo0=country&geo1=IRN2

[7]. https://www.who.int/water_sanitation_health/publications/glaas-report-2019/en/

IMPACT OF CLIMATE CHANGE ON WATER

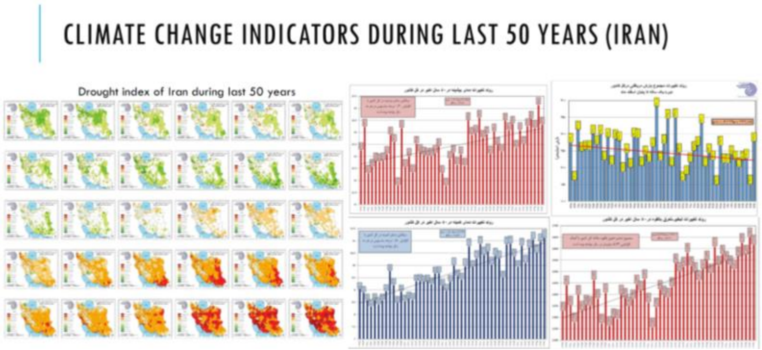
Water changes towards the end of 21st century according to AR5



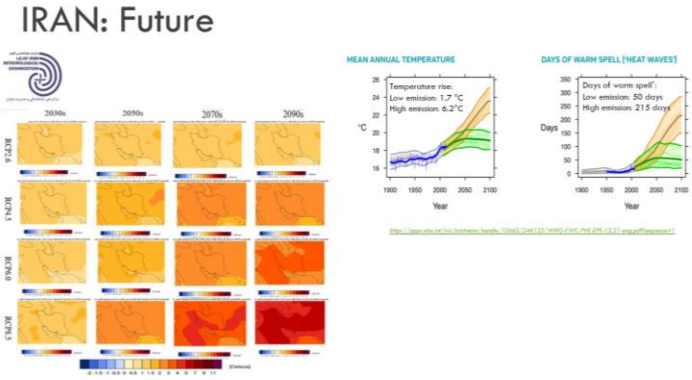
Component	Key issues and impacts
Evaporation – precipitation	• Changes in evaporation exceed precipitation (less runoff and recharge) in Central North America; Central America, Northern South America, Southern Chilean Coast, Southern Africa, western Europe, the Mediterranean, and south central Asia • Precipitation exceeds evaporation (more runoff and recharge) in the high latitudes, eastern North America, Northwest South America; Central Africa, India and east Asia
Groundwater	• Surface water recharge is strongly tied to groundwater variability in unconfined aquifers • Increased abstraction from population growth and reduced surface water availability could result in declining groundwater levels, particular in areas experiencing warming and precipitation deficits
Streamflow	• Significant regional variation range in run-off and stream flow. Stream flows in high-latitude rivers increase • Increased precipitation intensity leads to greater floods and can exacerbate droughts as well
Coastal zones	• Increased inundation and coastal flooding causing in salinization of groundwater and estuaries • Changes in the timing and volume of freshwater run-off affecting salinity, sediment and nutrient availability • Changes in water quality may come as a result of the impact of sea level rise on storm-water drainage operations and sewage disposal in coastal areas • Changes to the zonation of plant and animal species as well as the availability of freshwater for human use as a result of salinity advancing upstream due to decreased stream flow
Water quality	• Higher water temperatures may degrade water quality. This can be made worse by presence of pollution • Changes in flooding and droughts may affect water quality through sediments, nutrients, dissolved organic carbon, pathogens, pesticides and salt • Sea level rise is projected to extend areas of salinization of groundwater and estuaries
Demand, supply and sanitation	• Climate change will likely add further stress to water service issues including: supply, demand and governance

(Source: 5th Assessment Report, IPCC 2013)

CLIMATE CHANGE INDICATORS DURING LAST 50 YEARS (IRAN)

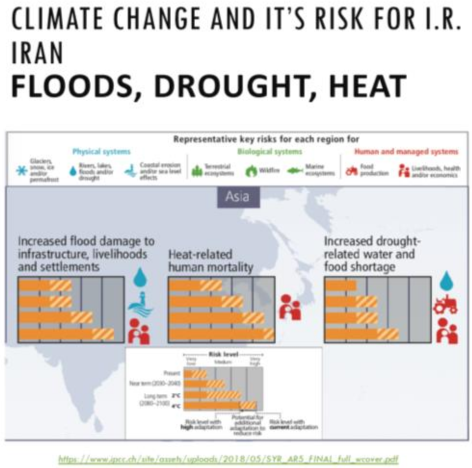


CLIMATE CHANGE INDICATORS DURING LAST 50 YEARS (IRAN)


IRAN: Future

https://apps.who.int/iris/bitstream/handle/10665/246125/WHO-FWC-PHE-EPE-15.21-eng.pdf?sequence=1

CLIMATE CHANGE AND IT'S RISK FOR I.R. IRAN FLOODS, DROUGHT, HEAT


CLIMATE CHANGE AND IT'S RISK FOR I.R. IRAN
FLOODS, DROUGHT, HEAT

https://www.ipcc.ch/site/assets/uploads/2018/05/SYR_AR5_FINAL_full_wcover.pdf

Health Implications Vector-borne disease (through changes in the temperature and humidity)

- Malaria;
- Leishmaniasis.

Water-borne disease (through floods and water shortage)

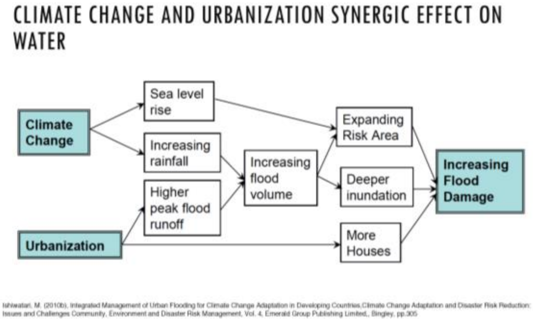
- Cholera and Typhoid;
- Diarrhea.

Non-communicable diseases (through heat waves and air pollution)

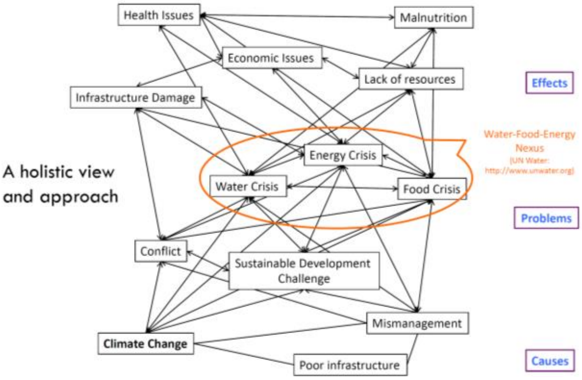
- Cardio-vascular;
- Disease;

- Respiratory;
- Disease;
- Allergies;
- Cancer**.**

CLIMATE CHANGE AND URBANIZATION SYNERGIC EFFECT ON WATER


CLIMATE CHANGE AND URBANIZATION SYNERGIC EFFECT ON WATER

Ishiwatari, M. (2010b), Integrated Management of Urban Flooding for Climate Change Adaptation in Developing Countries,Climate Change Adaptation and Disaster Risk Reduction: Issues and Challenges Community, Environment and Disaster Risk Management, Vol. 4, Emerald Group Publishing Limited., Bingley, pp.305



COVID-19, EXTRA BURDEN ON WATER ISSUES

WMO: Water challenge -clean water for hand washing

- ➢ Water use has increased sixfoldover the past century and is rising by about 1% a year
- ➢ It is estimated that climate change, and higher frequency and intensity of extreme events –storms, floods and droughts, will aggravate ‘water stress’
- ➢ Poor water management tends to exacerbate the impacts of climate change, not only on water resources but on society as a whole

- ➢ Washing or sanitizing hands is effective to slow down transmission of COVID-19
- ➢ But 4.2 billion (55% of the world's population) don't have even basic hand washing facilities at home. E.g. vulnerability to disease and ill health is higher, especially in poor rural areas, as well as in informal urban settlements[8]

Other environmental crises being ignored at the time of COVID-19:

- Pollutions (air, land, and water)
- Waste management (Plastic bags, etc.)
- Land-use change
- ...

WATER, CLIMATE CHANGE, AND COVID-19: PRIORITISING THOSE IN WATER-STRESSED SETTINGS[9]

An urgent need to improve water forecasting and monitoring and management of supplies to guide the planning of water projects in response to accelerating climate change Importance of such planning due to COVID-19; allocation of water resources must priorities those at greatest risk, such as communities in informal settings

Water and climate are central to achieving

- ❖ "Global goals on sustainable development, climate change and disaster risk reduction."

To strengthen global health systems and protect the health of communities, urgent action is needed that recognizes the critical link between environment and COVID-19[10].

SOLUTIONS (SUGGESTIONS)

An Integrated Water Resource Management (IWRM) is needed[11]

- ✓ To consider demand and supply processes and actions;
- ✓ To involve stakeholders closely;
- ✓ To facilitate adaptive management through continuous monitoring, review and improvement.

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[8]. https://public.wmo.int/en/resources/coronavirus-covid-19/water

[9]. (SOURCE: THE LANCET CORRESPONDENCE)

[10]. https://www.thelancet.com/action/showPdf?pii=S2542-5196%2820%2930084-X

[11]. Ardalan, A., Rad, M. K., & Hadi, M. (2019). Urban water issues in the megacity of Tehran. InUrban Drought(pp. 263-288). Springer, Singapore.

Sustainable Sanitation and Water Management (SSWM): “water reuse” and “nutrient reuse”[12]
Water and Sanitation Safety Plans (WHO guides)[13,14,15]

Promoting Understanding of the Importance of Water at the Community and Government Levels[16]

Individual solutions: such as changing liquid soap with foam soap[17], hand knobs with pedal knobs, mechanical faucets to sensor-based faucets, etc.

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[12]. Ardalan, A., Rad, M. K., & Hadi, M. (2019). Urban water issues in the megacity of Tehran. InUrban Drought(pp. 263-288). Springer, Singapore.

[13]. https://apps.who.int/iris/bitstream/handle/10665/75141/9789241562638_eng.pdf?sequence=1&isAllowed=y3

[14]. https://apps.who.int/iris/bitstream/handle/10665/255649/WHO-FWC-WSH-17.03-eng.pdf?sequence=14

[15]. https://apps.who.int/iris/bitstream/handle/10665/171753/9789241549240_eng.pdf?sequence=15

[16]. Ardalan, A., Rad, M. K., & Hadi, M. (2019). Urban water issues in the megacity of Tehran. InUrban Drought(pp. 263-288). Springer, Singapore.

[17]. https://info.debgroup.com/blog/bid/349545/water-consumption-reduced-with-one-simple-change1

Disasters, Water, and Health: An Evolution in Approaches

Dr. Abbas Ostadtaghizadeh; MD, MPH, PhD Dean, Assistant Prof. Department of Disaster Public Health Tehran University of Medical Sciences

Increasing Disaster Risks

- ☐ Population Density (Urbanization);
- ☐ Settlements in high risk Areas;
- ☐ Increasing technological disasters;
- ☐ Terrorism;
- ☐ Elderly;
- ☐ Globalization;
- ☐ Emerging and reemerging Diseases.

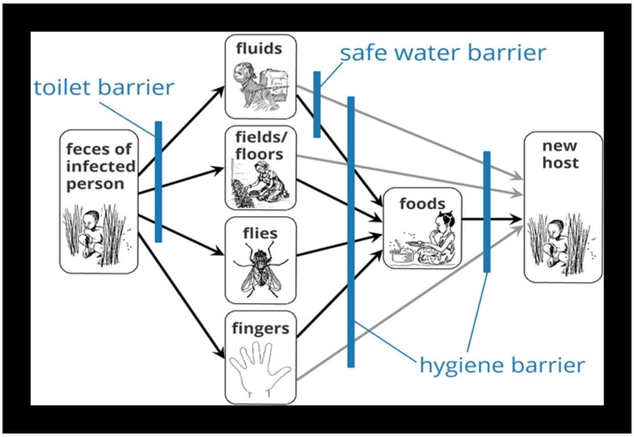
Disasters and water resources imbalance

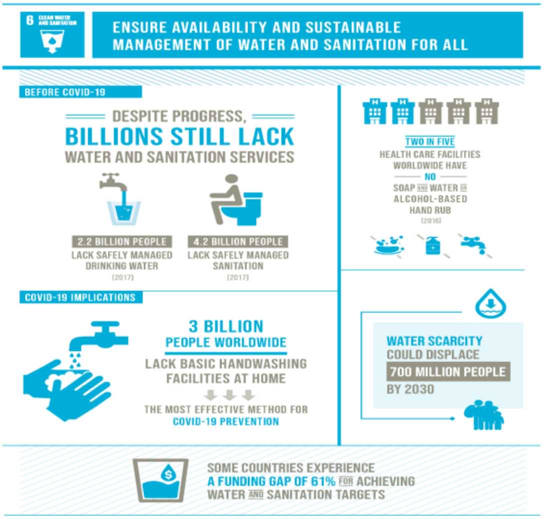
Increase in Water Demand	Decrease in Water Supply
Population Density	Climate change
Urbanization	High risk Areas
Epidemics	Water contamination: ○ Urbanization ○ Epidemics ○ Industrialization
Industrialization	

Water, Sanitation and Health

- ❖ Access to safe drinking water and sanitation are among the most important requirements for controlling in factious and non-communicable diseases;
- ❖ In 2017, the burden of disease attributable to WASH risks in terms of death and disability adjusted life years (DALYs) at global level were estimated to be 1,613,692 and 84,407,922;
- ❖ 2.9% and 3.4% of the total deaths and DAYLs.

WASH for prevention of Epidemics





6 CLEAN WATER AND SANITATION

ENSURE AVAILABILITY AND SUSTAINABLE MANAGEMENT OF WATER AND SANITATION FOR ALL

BEFORE COVID-19

DESPITE PROGRESS,
BILLIONS STILL LACK
WATER AND SANITATION SERVICES

2.2 BILLION PEOPLE
LACK SAFELY MANAGED DRINKING WATER
(2017)

4.2 BILLION PEOPLE
LACK SAFELY MANAGED SANITATION
(2017)

TWO IN FIVE
HEALTH CARE FACILITIES WORLDWIDE HAVE
NO
SOAP AND WATER OR ALCOHOL-BASED HAND RUB
(2016)

COVID-19 IMPLICATIONS

3 BILLION
PEOPLE WORLDWIDE
LACK BASIC HANDWASHING FACILITIES AT HOME
THE MOST EFFECTIVE METHOD FOR COVID-19 PREVENTION

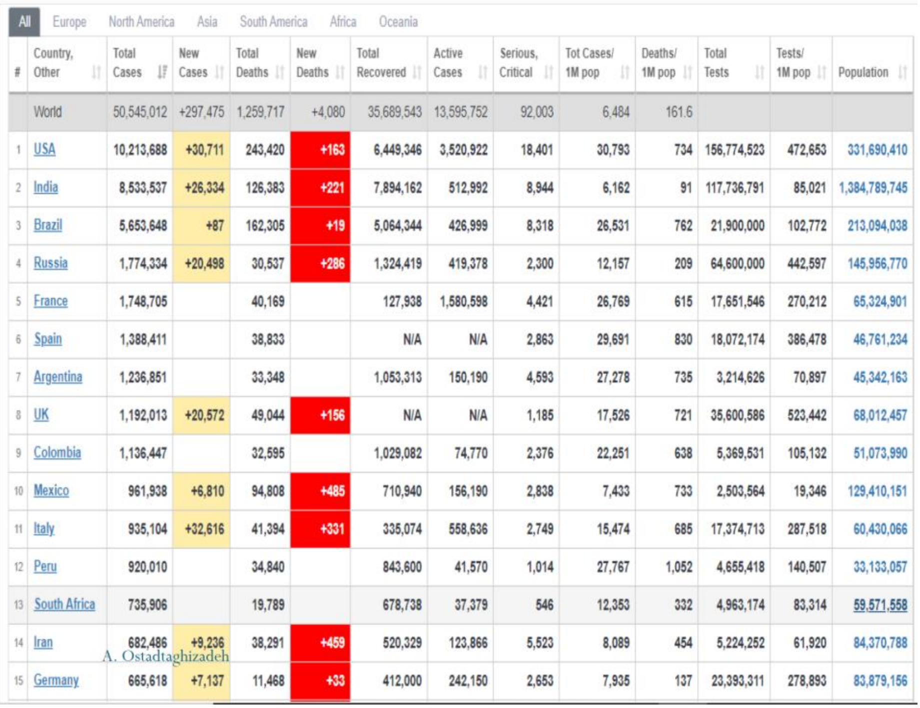
WATER SCARCITY
COULD DISPLACE
700 MILLION PEOPLE
BY 2030

SOME COUNTRIES EXPERIENCE
A FUNDING GAP OF 61% FOR ACHIEVING
WATER AND SANITATION TARGETS

Prevention and control of respiratory infections

- Physical distancing;
- Patient's Physical quarantining;
- Handwashing.

The Meta-analyzes showed that regular hand washing reduces 23 % of acute respiratory infections.



#	Country, Other	Total Cases	New Cases	Total Deaths	New Deaths	Total Recovered	Active Cases	Serious, Critical	Tot Cases/ 1M pop	Deaths/ 1M pop	Total Tests	Tests/ 1M pop	Population
	World	50,545,012	+297,475	1,259,717	+4,080	35,689,543	13,595,752	92,003	6,484	161.6			
1	USA	10,213,688	+30,711	243,420	+163	6,449,346	3,520,922	18,401	30,793	734	156,774,523	472,653	331,690,410
2	India	8,533,537	+26,334	126,383	+221	7,894,162	512,992	8,944	6,162	91	117,736,791	85,021	1,384,789,745
3	Brazil	5,653,648	+87	162,305	+19	5,064,344	426,999	8,318	26,531	762	21,900,000	102,772	213,094,038
4	Russia	1,774,334	+20,498	30,537	+286	1,324,419	419,378	2,300	12,157	209	64,600,000	442,597	145,956,770
5	France	1,748,705		40,169		127,938	1,580,598	4,421	26,769	615	17,651,546	270,212	65,324,901
6	Spain	1,388,411		38,833		N/A	N/A	2,863	29,691	830	18,072,174	386,478	46,761,234
7	Argentina	1,236,851		33,348		1,053,313	150,190	4,593	27,278	735	3,214,626	70,897	45,342,163
8	UK	1,192,013	+20,572	49,044	+156	N/A	N/A	1,185	17,526	721	35,600,586	523,442	68,012,457
9	Colombia	1,136,447		32,595		1,029,082	74,770	2,376	22,251	638	5,369,531	105,132	51,073,990
10	Mexico	961,938	+6,810	94,808	+485	710,940	156,190	2,838	7,433	733	2,503,564	19,346	129,410,151
11	Italy	935,104	+32,616	41,394	+331	335,074	558,636	2,749	15,474	685	17,374,713	287,518	60,430,066
12	Peru	920,010		34,840		843,600	41,570	1,014	27,767	1,052	4,655,418	140,507	33,133,057
13	South Africa	735,906		19,789		678,738	37,379	546	12,353	332	4,963,174	83,314	59,571,558
14	Iran	682,486	+9,236	38,291	+459	520,329	123,866	5,523	8,089	454	5,224,252	61,920	84,370,788
15	Germany	665,618	+7,137	11,468	+33	412,000	242,150	2,653	7,935	137	23,393,311	278,893	83,879,156

Three necessities for sustained handwashing

1. Availability of sufficient flowing water;
2. Availability of soap and hand sanitizers;
3. Behaviors practiced by individuals.

Worldwide handwashing facilities

- ✓ 95% of the population in high-income countries has access to a ‘designated handwashing facility’;
- ✓ Only 70% in low-income countries;
- ✓ In sub-Saharan Africa, the population in households with access to handwashing facilities with soap and water is 26 %.

Behaviors practiced by individuals

“However, this situation did not last for long and gradually the families got used to the new situation and water consumption became more balanced in many provinces of the country,”11

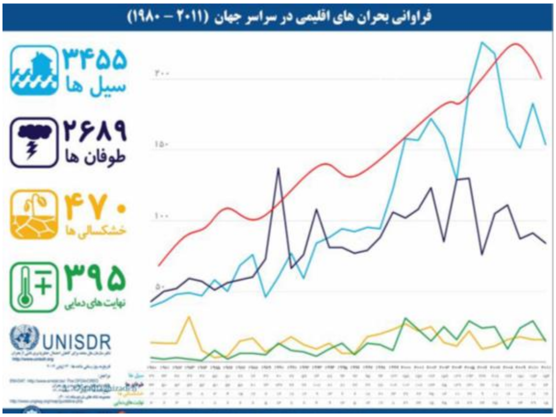
Water consumption in Iran rises 35% following coronavirus outbreak

June 6, 2020 - 15:2 Economy

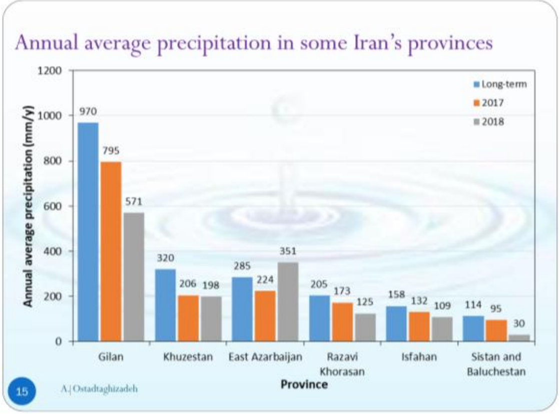
TEHRAN – Water consumption in Iran has increased by 35 percent following the coronavirus outbreak in the country, IRNA reported, quoting Deputy Energy Minister for Water and Wastewater Affairs.

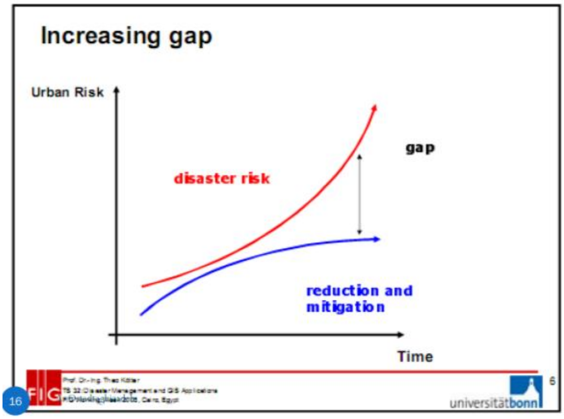
Climate Change and Water Consumption

- ❖ Climate change has many adverse effects on the quantity and quality of water resources;
- ❖ This can seriously threaten drinking water supply and public health;
- ❖ Due to climate change, the amount of water available in many parts of the world has become unpredictable.



Annual average precipitation in some Iran's provinces


Annual average precipitation in some Iran's provinces

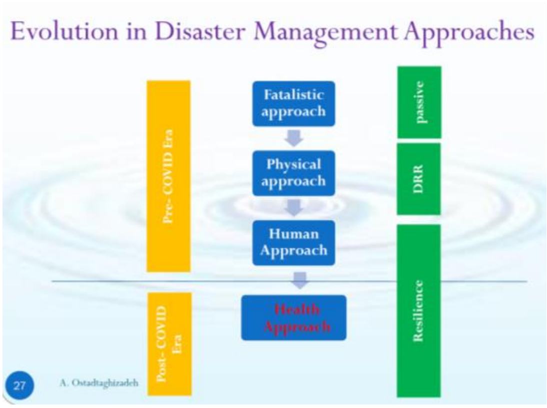

Increasing gap

Risk Reduction and mitigation are flatting

- Weak community role;
- Poor intersectoral actions;
- Top down approach;
- Neglecting human development.

Community based disaster management

- ✓ Preparedness and response to these global threats demand interdisciplinary and community involvement (World Health Organization)



Evolution in Disaster Management Approaches

Pre- COVID Era

Post- COVID Era

Fatalistic approach

Physical approach

Human Approach

Health Approach

passive

DRR

Resilience

27

A. Ostadtaghizadeh

We are moving:

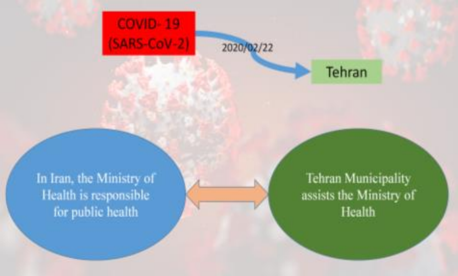
1. From Capacities to the Abilities;
2. From Freedom of risks to living with risks;
3. From Compromise to Compatibility;
4. From Resistance to Flexibility;
5. From Stability to Sustainability;
6. From reactive to proactive.

Sustainable water resources for municipalities

Dr. Shina Ansari; Head of Environment and Sustainable Development Department of Municipality of Tehran

First of all, I would like to discuss the role of Municipality of Tehran as an executive body which provides urban services during the COVID-19 pandemic. Briefly, municipal activities in this period are classified into two major categories:

1. Taking the crucial responsibility to provide for the public health needs in cooperation with Iran's Health Ministry;
2. Providing services in the fields of public transportation, the collection and disposal of waste, as well as maintenance of the city in accordance with the protocols of the National Headquarters of Administrating COVID-19 and in cooperation with other related organs.



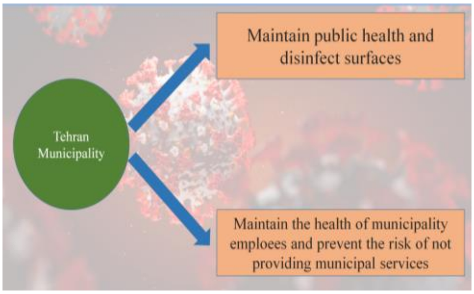
COVID- 19 (SARS-CoV-2)

2020/02/22

Tehran

In Iran, the Ministry of Health is responsible for public health

Tehran Municipality assists the Ministry of Health



Tehran Municipality

Maintain public health and disinfect surfaces

Maintain the health of municipality emploees and prevent the risk of not providing municipal services

Regarding disinfection of public places in the city, since late April 2020, following the protocols of the National Headquarters of Administrating COVID-19, public transportation (on streets and urban spaces) including subway trains, buses, etc. have been disinfected. So far, the lectures have shown concern about the quantity of water, while we all have been forced to use sanitary disinfectants during the Coronavirus disease pandemic, and the quality of water resources has been severely affected by the use of various disinfectants.

Maintain public health and disinfect surfaces

Disinfecting subway trains, inside their cars, exterior surfaces of subway cars and the surfaces inside subway stations, buses, terminals, bus stations, taxis and generally, most of the country's streets and urban spaces was carried out from the very beginning.

Because of the unknown nature of this emerging disease, firstly the issue of street disinfection was taken into account, whereas in the revision of the official instructions, street disinfection was eliminated in the later official announcements, for it was believed that this method only works indoors. Therefore, disinfection of urban spaces and streets was abandoned due to environmental hazards and the fact that these hazards were one of the concerns of the municipality because the attempt proved futile and ineffective in dealing with the virus.

Disinfection could pose an environmental hazard because the major disinfectants employed were stable organic compounds and mainly chlorine compounds that can contaminate water and soil resources. The Environment Department of Municipality of Tehran placed the formulation of environmental instructions for disinfectants on the agenda, of course, with the cooperation of all specialized units that were involved in some way in relation to dealing with Coronavirus, including environmental and health experts. The environmental instructions were prepared by Municipality of Tehran and were announced to its subsidiary units as environmental standards that should be met. These guidelines were issued and carried out in accordance with international protocols for using all common chemicals and physical methods for disinfection, adopting an effective and economical approach and considering the least possible damage to the environment, for separate usage indoors and outdoors in Iran's metropolitan areas. Moreover, the guidelines were proposed as a model in the specialized environment committee of Iran's metropolitan areas. However, due to new issues about this emerging disease, publication of a second edition is currently under way.

شهرداری تهران
معاونت خدمات شهری و محیط زیست
اداره کل محیط زیست و توسعه پایدار

دستورالعمل محیط زیستی نحوه مصرف مواد ضد عفونی
کننده مورد استفاده در شهرداری تهران در زمان شیوع
ویروس کرونا

فروردین‌ماه ۱۳۹۹

ویرایش یک

The second subject is to protect the service personnel, which is so important so that the activities of service providers and other departments related to dealing with the aforementioned issue continue through following the protocols, instructions and official announcements of the National Headquarters of Administrating COVID-19. To achieve the objective, such measures as teleworking, shiftwork, regular COVID-19 testing of personnel, control measures and distribution of disinfectants and masks, etc. were taken. Another important measure taken in order to stop the spread of infections and help Municipality of Tehran continue municipal service activities according to instructions and protocols and without any interruptions under such critical circumstances was distance or virtual education for municipal employees, contractors and workers. Thus, the municipality intends to focus more on its staff including workers and contractors so that they can smoothly continue performing their jobs. Municipal services include any function concerning the city's public transportation such as subway system, buses and taxis, as well as sweeping the streets, household and hospital waste management, especially disposal of infectious and COVID-19 waste, surface water management and so forth.

The next issue related to the municipal functions is the certain jobs that should be performed in Tehran's largest cemetery, called Behesht-e Zahra. One of the tasks is rinsing the dead bodies of individuals confirmed for COVID-19. These functions still continue due to the high daily death toll from COVID-19. The daily number of confirmed Coronavirus deaths in Tehran has announced to be at least 100 people, a number which is certainly less than the real number of daily deaths. Another critical issue is that washing COVID-19 corpses in the cemetery produces about 20,000 liters of wastewater which are poured into the sewage disposal system. Therefore, the sewage disposal system in 'Behesht-e Zahra cemetery' should have been redesigned and an expert official announcement concerning the pandemic that has the least environmental and health hazards should have been prepared. Such an announcement was designed and some actions were performed which are as follows:

- The level of chlorination increased from 0.2 to 2 ppm in consultation with the Ministry of Health and Medical Education.
- The wastewater caused by washing COVID-19 dead bodies was no longer directed to surface water and was diverted to absorbing wells.

Because the standards that we use as a criterion of environmental practice for the receiving resources include some criteria and the subject of the virus is not included in those standards, we tried to control the issue to some extent, and surveys and observations revealed that the contamination caused by the wastewater from the bathhouse in Behesht-e Zahra (a place where dead bodies are washed) has been controlled to some extent. The relevant experts should investigate how we can be certain about the wastewater coming out of Behesht-e Zahra cemetery's sewage disposal.

The next topic is about water consumption in Tehran as a metropolis. Water consumption in Tehran is 60% more than the international norm. The per capita consumption in Tehran is reported to be 20-35 liters of water each day. The consumption considerably increased at the onset of the COVID-19 pandemic; however, it has recently been reduced, and now the increase in the consumption is 7% on average. A very important issue is the pressure of the excessive consumption is on the underground resources.

The permitted amount of water utilized from the Tehran plain is 250,000 cubic meters per year, while it has been announced that the amount of water currently utilized is 850,000 cubic meters per year. The current annual share of Tehran Municipality is about 150,000 cubic meters for irrigation of the green spaces. This amount does not include that water consumed in firefighting services and other city maintenance costs and municipal services. In fact, Municipality of Tehran consumes water mainly for irrigating urban green spaces, an amount which is provided annually from underground resources.

Currently, the issue of water sustainability in meeting the urban needs is one of the municipality's top priorities. It has been clarified in the third development plan of Tehran city, which encompasses the action guidelines and is a road map for achieving municipal objectives. Hence, considering the limitation of water resources as a result of such factors as climate change, drought, Coronavirus pandemic, etc., the issue of sustainable water supply is essential for urban management. To achieve the goal, we have taken into account some measures as the central functions in Tehran Municipality, which are as follows:
1. Increasing the efficiency of irrigation by applying smart irrigation systems;
2. Establishment of local water treatment plants in Tehran in addition to the Ministry of Energy's water treatment plants so that we can use treated wastewater for irrigation, an action which reduces the burden on groundwater resources. Preliminary works on this issue has started in District 22 and in District 13 is about to be done;
3. As the municipality is in charge of the surface water of the city, it is used to meet the needs of the city. Also, it should also be recycled and purified for later required consumptions.
4. The purchase of wastewater;
5. changing the cultivation pattern by removing and replacing plants that need a lot of water with plants adapted to water shortage and climate of Tehran;
6. Reducing the size of urban lawns;
7. Planting native plants which need less water to grow;
8. Reviving the qanats (traditional Iranian subterranean canals) which we inherit from our

The most frequent approach employed in the past decades in different cities of Iran was short-term, such as planting grass and plants that grow rapidly, most of which were non-native. Now the attitude is changing towards tolerance and adaptation.
The outcome of the comprehensive agreement between Iran's Ministry of Energy and Municipality of Tehran concerning the procedures of providing sustainable water for urban green spaces of Tehran should be supplying the sufficient amount of water for the green spaces by Ministry

of Energy’s water treatment plants and reducing the amount of groundwater consumption by approximately 53 million cubic meters.

MOU for Optimizing Water Consumption

وزارت نیرو

بسمه‌تعالی

تفاهم‌نامه جامع

سازوکار تأمین پایدار آب فضای سبز شهر تهران

مقدمه

در راستای اجرای مفاد ماده ۲۲ قانون هوای پاک و تقویت همکاری‌ها و تعاملات بین‌بخشی و به منظور تامین آب خام مورد نیاز آبیاری فضاهای سبز و بوستان‌های شهر تهران که در ارتقای کیفیت محیط‌زیست شهری امری انکارناپذیر می‌باشد و همچنین صیانت از منابع آب‌های زیرزمینی و آب شرب و در مقابل جایگزین نمودن روان‌آب‌ها، آب‌های سطحی و پساب تصفیه‌شده فاضلاب شهری برای آبیاری عرصه‌ها و فضاهای سبز در شهر تهران به عنوان راهکاری منطقی و عملی برای حفظ ذخایر ارزشمند آب‌های زیرزمینی و مقابله با مخاطرات ناشی از کاهش بارندگی و نزولات آسمانی در شهر تهران، تفاهم‌نامه حاضر به منظور نیل به اهداف مزبور منعقد می‌گردد.

ماده ۱. طرفین تفاهم‌نامه

این تفاهم‌نامه بین وزارت نیرو به نمایندگی جناب آقای دکتر رضا اردکانیان وزیر نیرو و شهرداری تهران به نمایندگی جناب آقای دکتر پیروز حناچی شهردار تهران، منعقد می‌گردد.

ماده ۲. موضوع تفاهم‌نامه

تقویت تعاملات بین‌بخشی، همکاری‌های دوجانبه و هم‌افزایی لازم با هدف رفع مشکلات و استفاده از ظرفیت‌های موجود بین دو مجموعه وزارت نیرو و شهرداری تهران برای ارائه خدمات‌رسانی مطلوب به شهروندان در زمینه تامین آب فضای سبز شهر تهران از منابع آبی و پساب طبق مدل پیشنهادی و مدیریت سیلاب شهری.

ماده ۳. مدت زمان اعتبار تفاهم‌نامه

این تفاهم‌نامه از تاریخ امضا معتبر است و هرگونه تغییر در مفاد آن با تفاهم کتبی طرفین و در قالب الحاقیه دارای اعتبار خواهد بود.

ماده ۴ . محورهای همکاری

۱) در جهت اجرای برنامه نگهداشت و توسعه فضای سبز شهر تهران تا افق سال ۱۴۱۰ در بخش‌های مختلف، برنامه توسعه پیشنهادی فضای سبز شهر تهران مطابق جدول ذیل ملاک تفاهم طرفین می‌باشد.

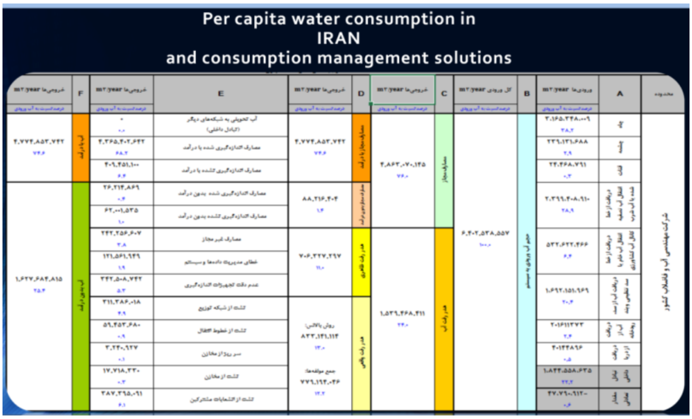
شاخص‌های تخصصی	واحد	۱۳۹۹	۱۴۱۰
مساحت بوستان‌ها و تفرجگاههای احداث‌شده درون‌شهری	هکتار	۵،۹۵۶	۶،۵۸۰
مساحت فضای سبز ایجادشده در معابر شهر تهران	هکتار	۸،۲۳۹	۸،۵۲۹
مساحت جنگل‌کاری و کمربند سبز پیرامون شهر تهران	هکتار	۴۲،۵۸۲	۵۰،۰۰۰

صفحه ۱ از ۳

Covid 19 and the pattern of water consumption with a focus on per capita water consumption in Iran and water consumption management strategies

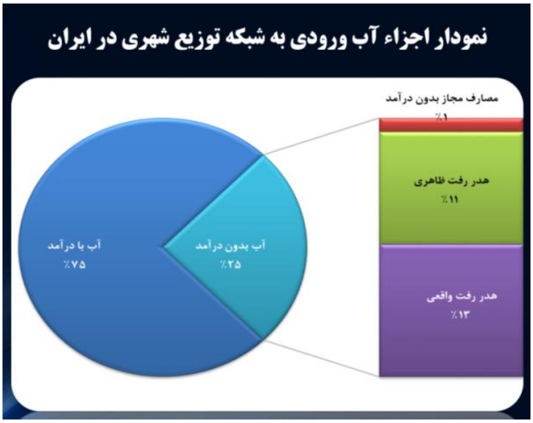
Mr. Seyed Ali Seyedzadeh; General Director of Public Relations of Water and Wastewater Engineering Companies

I will first explain the per capita and related issues. The table below shows production and consumption in municipal water and sewage companies, which really get acquainted with the amount of production and consumption. The title is the balance sheet and according to international water standards, it is prepared annually in the country's water and wastewater engineering company. Distribution or inflow of water to the municipal system or network from various sources has been shown that. What is the share of four springs, aqueducts, receipts from treatment water lines and each? Where and how is this amount of water that comes to the network consumed? What part of it is a waste? Which is used here with the word water without income and what part of it is consumed?

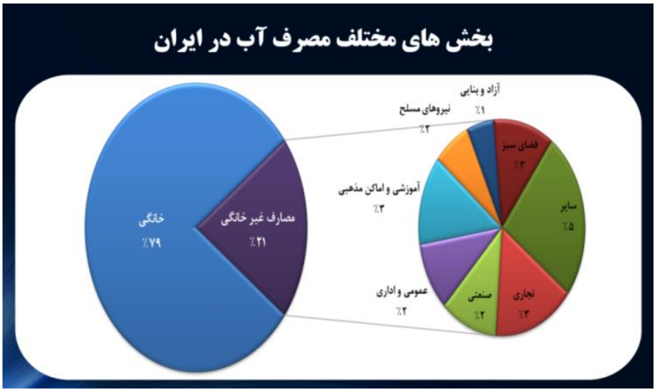


Per capita water consumption in
IRAN
and consumption management solutions

This statistic are related to the year 1398 and about 6 billion and 402 million cubic meters of water enters the urban distribution network. The permissible consumption is 4 billion and 863 million cubic meters or 76% of this amount is in the form of consumption for which we actually issue a bill. 1 billion and 539 million cubic meters includes apparent and real waste. There is another term called allowable expenditure without income, which means that in fact, permitted expenditure is divided into two parts with income and without income. Allowable expenses without income means they are allowed but have no income such as school expenses, places, offices and network washing. Therefore, out of the total of 6 billion and 402 million cubic meters of water that has entered the distribution network, 4 billion and 774 million cubic meters have been used for which a bill has been issued and 1 billion and 627 million cubic meters is equivalent to 25.4% of non-revenue water, which is 13 Percentage is actually and physically wasted from the network, which is from the distribution network and reservoirs and transmission lines, and 11 percent is apparent loss, which includes unauthorized use, data and system management error, carelessness of measuring equipment and 4 / 1% of the allowable non-revenue expenditures described earlier. The speaker emphasizes in this section more on how the water consumption is, the amount of water that has entered the distribution network and the amount of water consumed.



The diagram above shows the components of water entering the urban distribution network, as described earlier. 75% of the water for which the bill was issued and sold and 25% of the non-revenue water for which the bill was not issued.

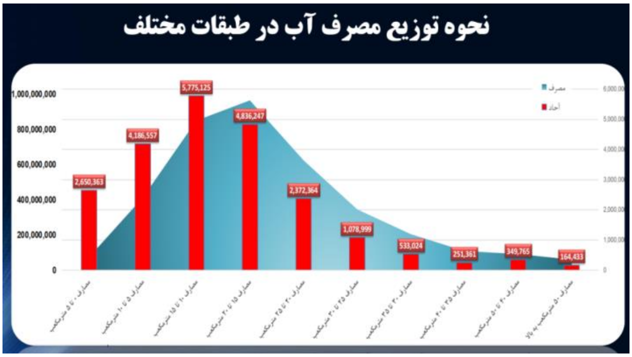


This chart shows the different sectors of water consumption in Iran. 79% is related to household consumption and about 21% is non-household consumption, which includes green space, free and construction, armed forces, educational and religious, public and administrative, commercial, industrial places and other uses. The highest rate in water distribution and consumption networks is for the home sector, which is a clear issue.

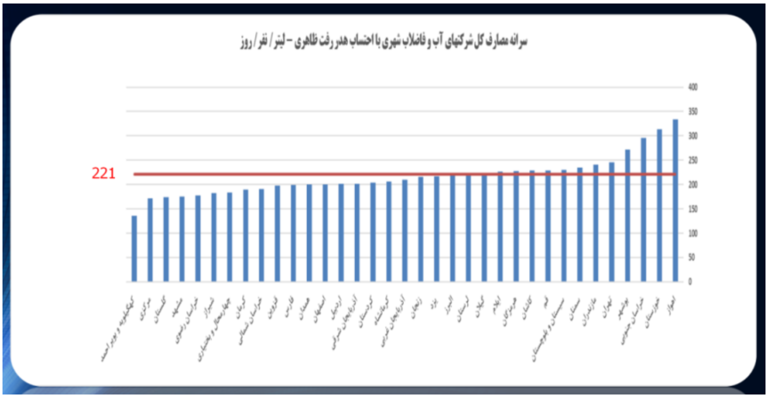

طبقات و حجم مصرف آب (مترمکعب/سال)

طبقات مصرف	آحاد	مصرف
مصارف 0 تا 5 مترمکعب	۲۶۵۰۳۶۲.۷۵	۷۴۹۶۵۶۸۹.۷۳
مصارف 5 تا 10 مترمکعب	۴۱۸۶۵۵۷.۳۸	۴۱۰۸۲۰۶۲۶.۸
مصارف 10 تا 15 مترمکعب	۵۷۷۵۱۲۵.۳۸	۸۵۱۱۵۱۵۰۴.۹
مصارف 15 تا 20 مترمکعب	۴۸۳۶۲۴۶.۶۳	۹۶۶۰۶۲۳۵۳.۸
مصارف 20 تا 25 مترمکعب	۲۳۷۲۳۶۴.۲۵	۶۲۴۴۱۱۲۵۱
مصارف 25 تا 30 مترمکعب	۱۰۷۸۹۹۸.۶۳	۳۴۴۵۰۰۸۰۶.۹
مصارف 30 تا 35 مترمکعب	۵۳۳۰۲۴.۳۷۵	۲۰۳۷۸۶۲۸۶
مصارف 35 تا 40 مترمکعب	۲۵۱۳۶۱.۲۵	۱۰۸۱۶۵۲۱۴.۹
مصارف 40 تا 50 مترمکعب	۳۴۹۷۶۵.۱۲۵	۹۲۰۹۸۱۳۳.۸۵
مصارف 50 مترمکعب به بالا	۱۶۴۴۳۲.۸۷۵	۶۰۰۷۷۰۹۰.۷۹
جمع	۲۲۱۹۸۲۳۸.۶	۳۷۳۶۰۳۸۹۵۹

This table shows the home consumption classification. The billing system in Iran is hierarchical and is considered suitable for different levels of consumption.

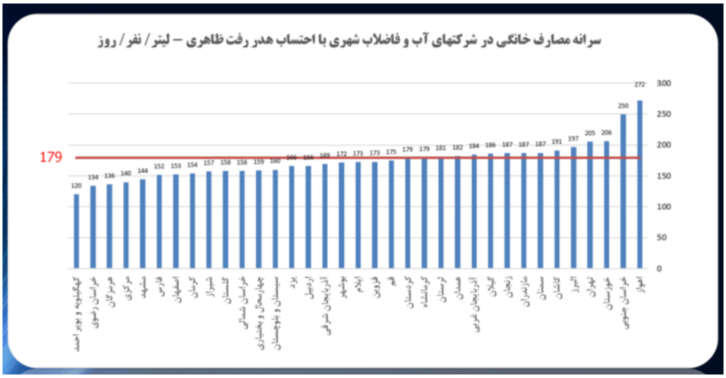


نحوه توزیع مصرف آب در طبقات مختلف



سرانه مصارف کل شرکتهای آب و فاضلاب شهری با احتساب هدر رفت ظاهری – لیتر / نفر / روز

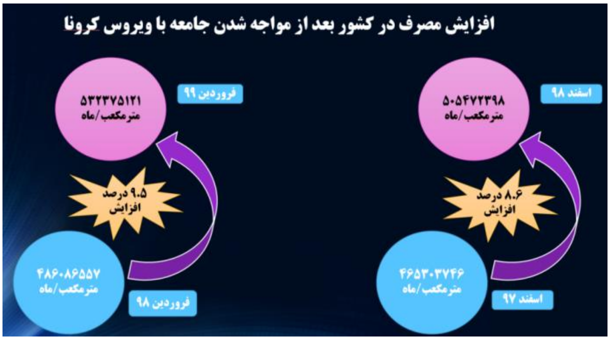
The total per capita consumption is 221 liters per person per day



سرانه مصارف خانگی در شرکتهای آب و فاضلاب شهری با احتساب هدر رفت ظاهری – لیتر / نفر / روز

Per capita household consumption, including apparent waste, the average in Iran per person per day is 179 liters. The cities of Ahvaz, South Khorasan, Khuzestan, Tehran and Alborz have the highest per capita water consumption.

Water consumption in the country increased after the community was exposed to the Corona virus. The number of washes increased from an average of about 5 times a day to 10 to 20 times a day.



This caused the amount of water consumption in the country in March 1398 compared to March 1997 increased by about 9 percent per month. In April 1399, compared to April 1398, we had a 10% increase in consumption. This sudden increase in consumption was much greater than the increase in population, and in the months when we were exposed to the Corona virus, water consumption increased significantly.

Here are some simple steps you can take to begin the process of preparation for mediation:

1. Using a variety of water-reducing equipment: using a variety of water-reducing headers, water-reducing heads or plotters, water-reducing heads, 2-stage low-consumption flash tank;
2. Washing time management for hands, showers and dishes. When washing, it is repeatedly emphasized that the faucet does not need to be left open for 30 seconds. Close the faucet when the hand is soaked in detergent. Soaking hands; Impregnate with detergent (soap) and then rinse. Reduce faucet opening time when hand washing: Recommended hand washing steps to save water: 1. soaking the hands 2. Impregnating with detergent (soaping)
3. Rinsing in the soaping stage, there is no need to keep the tap constantly open easier. If we do the same, in a population of 80 million people, about one billion liters per day will be equivalent to the water required by 6 million people with a per capita of 150 liters per person per day, which is equivalent to 578 water wells which occupies a considerable volume.

Consumption of ordinary taps and reducing water consumption

Tap type	Normal consumption without perlator with the assumption that the washing machine is healthy (liters per minute) at standard pressure	Consumption rate with perlator (Liters per minute) at standard pressure
Rolling faucet (old)	18-20	8-6
Electronic tap	15-18	8-6

This table provides information on the consumption of conventional valves and reducing water consumption.

A Brief Summary

Dr.Alexandros Makarigakis, Programme Specialist, Water for Human Settlements, UNESCO Headquarters

According to Dr Alexandros Makarigakis, good steps have been taken so far and population growth is not the only reason for increases in water consumption, but also climate change, COVID-19 pandemic and other reasons mentioned by the lecturers have led to the increases. Among the reasons, climate change can particularly have destructive effects. Droughts become longer and more frequent also floods will also come as a result. Thus, we have to learn how to live in such circumstances. In fact, we can invest in flow-through dams. First, we should take account of the consequences of climate change.

In fact, in the modern world, we are all victims of our own advances and achievements. In other words, when we turn on the tap, we wonder carefully if the water is clean and safe. It is a great success for humanity that is provided with such safe water, but at the same time it can also be dangerous. As some lecturers pointed out, people's participation is important. We need to change the way people think about consumption patterns. Now that water consumption is high, public awareness should be raised. If the awareness is not heightened, such consumption patterns will turn into conflicts that will have negative and irreparable consequences for societies in the future.

One of the roles IBF plays is to make us certain that people are aware of what is really happening around them. In the video played about washing, it was well shown that in the early 90's, there was a bad habit that the tap was left open when washing hands and face. Therefore, breaking the cultural habit of wasting water should be taken into account as a problem that is to be dealt with.

I would like to point out that we need to strengthen the water supply systems to reduce water loss in these systems. The water resources available to us, especially groundwater, are very limited. We should say the water that enters the wastewater system, which is not actually as a result of wasting water, can be utilized in different ways. Hence, I think this change in the way of thinking and the pattern of water consumption has already happened, but we need more cooperation of the public and without the cooperation, the water tension will increase. As I said before, we need to take some steps to manage our water resources. It's sensible to combine and implement all the comments and suggestions the lecturers made in order to help manage water resources.

Some of these steps are easy to be taken. Perhaps the city of Tehran is a good instance to say that we need coordination among different levels of government to have better management of water resources, especially during the COVID-19 pandemic. We should facilitate proposals, procedures, processes and decisionmaking, and develop a coordinated approach to take the necessary action, later on we should look for other more appropriate procedures and solutions. The issue that will make the transition from the Covid 19 pandemic crisis easier to know is the quantity and quality of water available to us, which is one of the most important aspects of water stress during the Corona epidemic. We must always be related to science in order to do much more effective work. Environmental issues, natural disasters and other examples given about Iran are very interesting, so we have to make sure we have access to water. Thank you to all the speakers and participants.

Dr. Akram Ghadimi

"Covid 19 and the pattern of water consumption"

The workshop topic is one of the significant challenges and issues that the world is struggling with. This workshop can promote current activities and encourage people and organizations to focus more on this field.

I request the UNESCO Regional Office and other related organizations and institutions to continue the necessary cooperation with Iranian Association for Popularization of Science in order to achieve this goal.

Furthermore, the videos, documents all the other resources related to responsible use of water can be produced alongside the workshop to enhance and improve the consumption culture of water. This part is well beyond this workshop's scope and will be discussed in our future events. Obviously, all the resources will be made accessible in our website. The reports and documents will also be provided to the UNESCO Regional Office.

Brochures and documents prepared for the workshop will delivered to the participants. Thank you to all the participants. I hope, many issues and problems will be solved next year during the Science Popularization Week and World Science Day for peace and development.

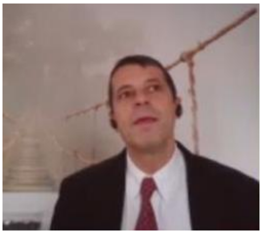
Participants will recurve all the conference material and brochures (email/hard copy).Thank you all for your participation and we hope you enjoyed the sessions.

We hope the conference provided you with great insights and ideas to tackle the issues related to the use of water. We are looking forward to seeing you in the next science popularization week and the world science day for peace and development in 2021(1400).

Appendix

Appendix 1: Workshop Video Report










Appendix 2:

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