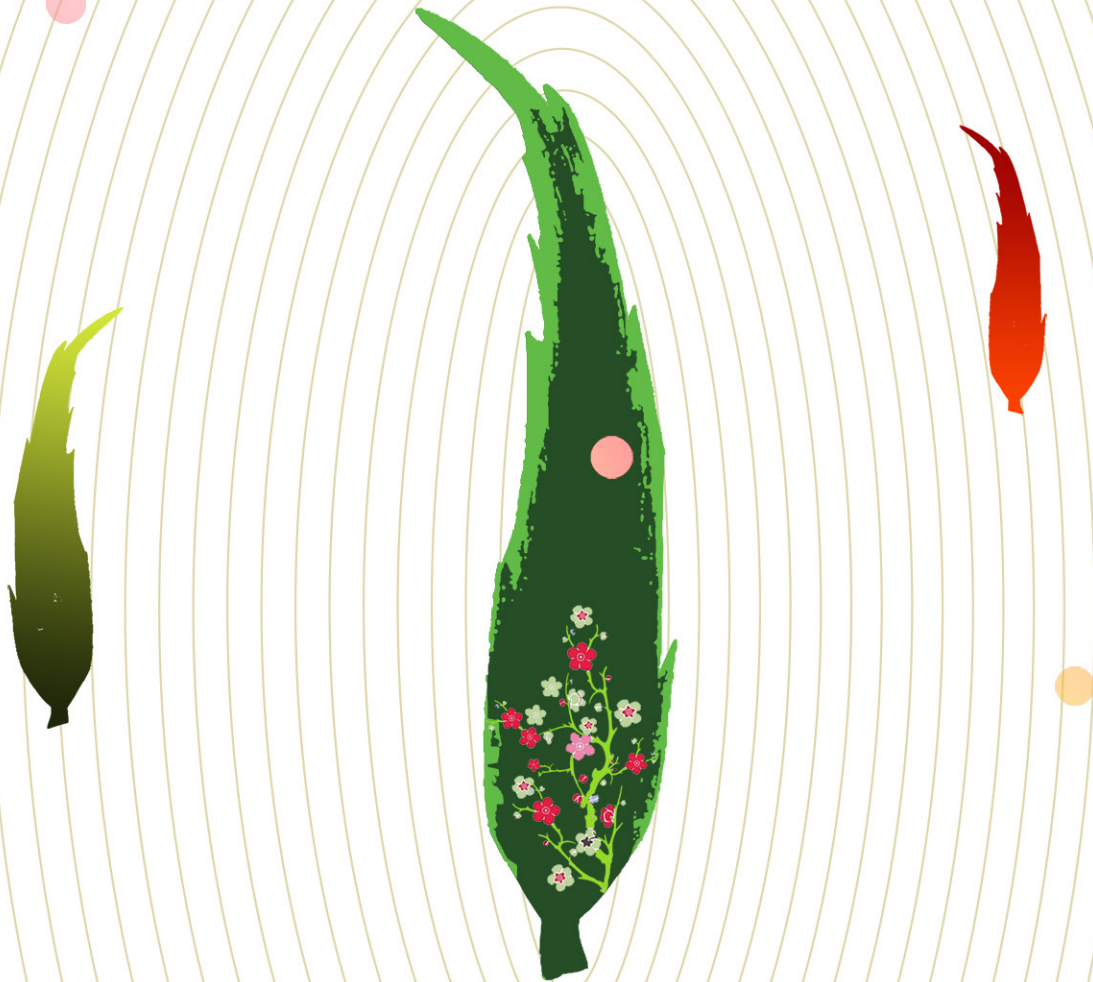


M CIMUSET

48TH CONFERENCE OF CIMUSET



CIMUSET TEHRAN

7-11 November

Museums & Environmental
Concerns, New Insights

cimuset.inmost.ir





Iranian National Museum of
Science and Technology
Central Office: no.57, Sepand
Gharbi Alley, Nejatollahi st.
Museum: 30 Tir, Street. Emam
Khomeini Ave., Tehran. Iran
Tel: 88914883(21)98+
Fax: 88851448(21)98+
www.inmost.ir



Ministry of Science, Research and
Technology
Hormozan and Southern Piroozan
Crossroads,
Khovardin St., Sana't Square, Tehran
Tel: 220 34 822(21)98+
Fax: 51 57 57 88(21)98+
<https://www.msrt.ir/en>



International Council of Museums
Maison del'UNESCO, 1 rue Miollis,
75732 Paris Cedex 15, France
Tel: 147340500(0) 033
Fax: 143067862(0)33+
<http://icom.museum>



ICOM Iran
No. 7, Saraye Parvin, Komeili Alley,
Mostafa Khomeini St.,
Baharestan Ave., Tehran. Iran
Tel: 33124562(21)98+
<http://icom-iran.com>



Iranian National Commission for
UNESCO
1,15st St., Shahid Hesari St.,
Mirdamamd Blvd.,
1548946111, Tehran, Iran
Tel.: (90 08 25 22 (21-98+
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<http://en.irunesco.org/>



CIMUSET
<https://cimuset.mini.icom.museum>

**CIMUSET 2021 booklet is edited under the supervision
of Professor Seifollah Jalili**

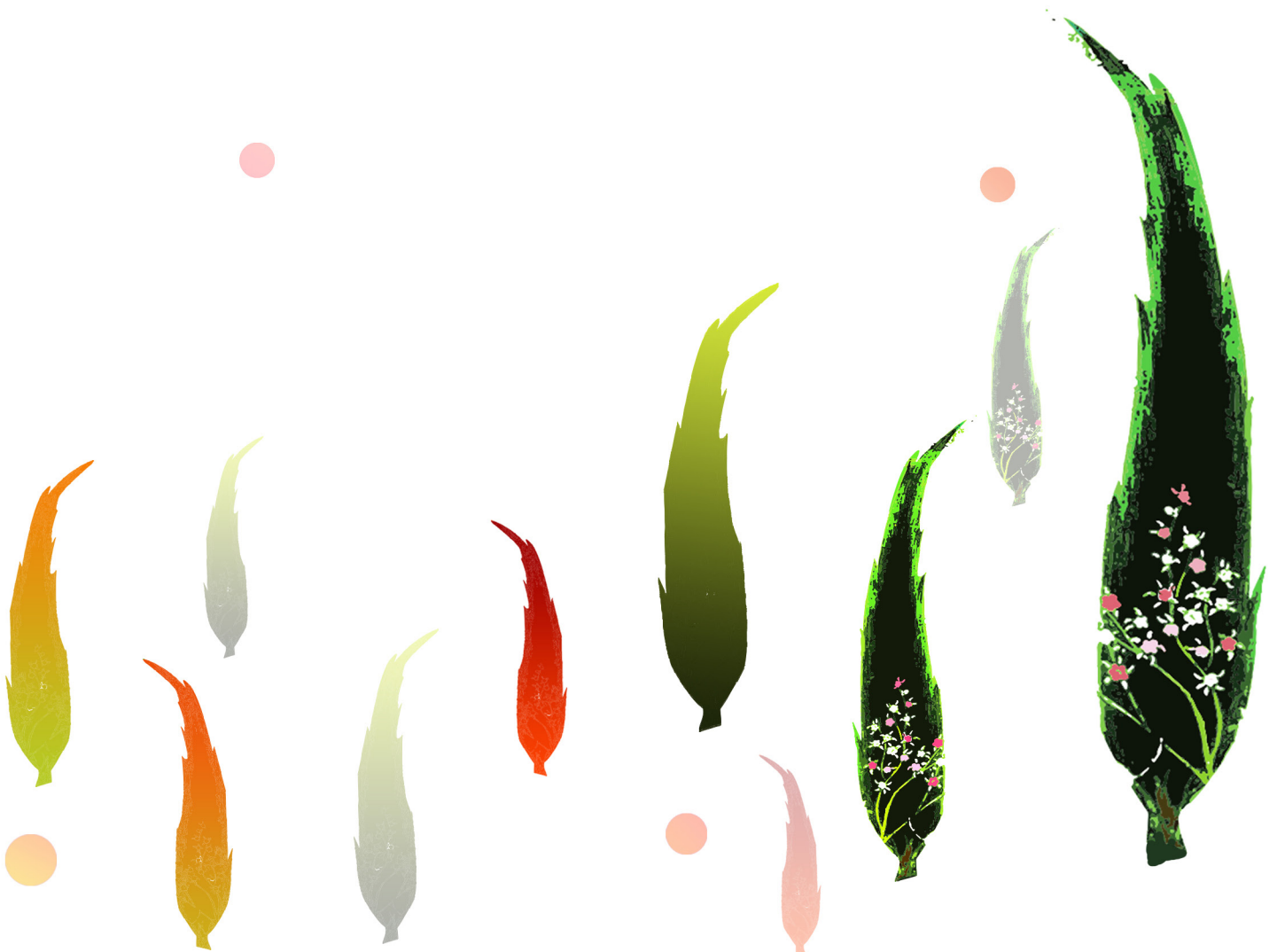


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Introduction

INMOST– Iranian National Museum of Science and Technology is pleased to welcome colleagues to participate for the 48th CIMUSET Annual Virtual Conference.

CIMUSET, the International Committee for Museums and Collections of Science and Technology, is an International Council of Museums (ICOM) committee composed of museum professionals from the fields of science and technology. It is held virtually in “Iranian National Museum of Science & Technology”, Tehran: 7th to 11th November 2021.

These issues are the result of many causes including the impact of global climate problems on Iran’s environment; national and local policies and individual actions. Furthermore, Iran is a developing country and it is crucial to harmonize the requirements of development and environmental sustainability. Iran as a country with varied and unique biological and climate diversity has a huge genetic and biological heritage.

Iranian National Museum of Science & Technology as a developing academic center tries to play a role in different social concerns like environmental issues by making connections between different stakeholders and informing the public about their role in improving the environment and solving environmental issues. The conference will also gather a diverse group to share their interests in science, museums, and the environment .

This will enable new connections between practitioners and researchers across national and cultural boundaries. For the first time in CIMUSET history, this conference was held in a hybrid format during the Covid-19 pandemic. The Proposed subthemes were a good occasion to push the boundaries of discussion around the main theme:

- Museums and improving public understanding of environmental issues
- Museums and Environmental Education
- Museums and Environmental Citizenship
- Museums and Sustainable Environment
- Museum Exhibition about Environmental issues
- Museums, Environment and Emergent Crises (COVID-19)



Scientific Committee



Seifollah Jalili
Chairman, Iranian National
Museum of Science and
Technology



Ech Cherki Dahmali
President of CIMUSET
Morocco



Fiorenzo Marco Galli
Director, Leonardo Da Vinci
Science and Technology
Museum
Italy



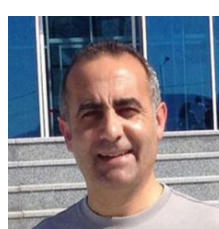
David Pantalony
Curator
Ingenium
Canada



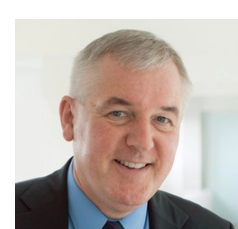
Sophie Biecheler
Director of
International Relations
at Unverscience
France



Manvi Seth
Head in the Department
of Museology, National
Museum Institute
India



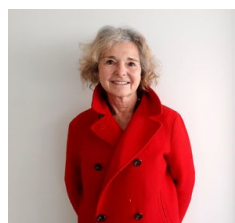
Gultekin Cakmakci
Associate Professor in
Science Education at
Hacettepe University
Turkey



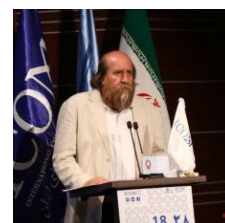
Hartwig LUDTKE
Director, Technoseum
Mannheim
Germany



Mikko Myllykoski
CEO at Heureka
Finland



Juliette Raoul Duval
Musée des Arts & Métiers
CIMUSET 2nd Vice
President
France



**Seyyed Ahmad Mohit
Tabatabaei**
ICOM Iran- Chairman
Iran



**Dr. Arash Javanshir
Khoei** Tehran
University -Faculty of
Natural Resources
Iran



Akram Ghadimi
Associate Professor,
President of Iranian
Association for
Popularization of Science
Iran



Naser Rezaie
Assistant Professor at
Research Institute for
Cultural Heritage and
Tourism
Iran



Manijeh Hadian Dehkordi
Research deputy of Research
Institute for Cultural Heritage and
Tourism (RICHT)
Iran

Conference Secretary

Program Committee



Parvaneh Asghari
INMOST- Head of
International Affairs



Fatemeh(Kimia) Amini
INMOST- Curator



Atefeh Hemmati
INMOST- IT



Mahsa safari
INMOST-Garphic
Designer



Mehran Norouzi
INMOST- Museum
Expert



Rahim Nikkhrou
INMOST- Head of Public
Relations



Yasser Rezaei
INMOST-Garphic
Designer



Azam Amini
Poster Designer



Welcome Message



Seifollah Jalili

Chairman- Iranian National Museum of Science and Technology

It seems that climate change has reached a dangerous stage and its effects on human life have become more vivid than before. It is obvious that these changes were not the result of our today and yesterday activities. It is because of human neglect toward nature and overuse of natural resources and fossil fuels. It should be noted that weather patterns change is the short-term effects and climate change is the destructive long-term effects of human activity on the environment. Although about 80 percent of greenhouse gases are emitted by industrialized countries, the effects of these changes have affected all human beings on the planet. Finding a solution can prevent the dangers of changes in the environment and climate, and every country and even every individual must take steps in this direction.

Although museums and science center's task is to protect tangible, intangible, and human cultural heritage, if we cannot do something to save the environment from its current situation, there may be no heritage to protect in the future. Right now, what we can do is raise awareness. The conference aims to draw attention to

climate change and provide solutions to educate and inform people on this issue. We hope that this gathering, as one of the most credible conferences in the field of science and technology museums, would be a positive step toward raising awareness among different levels of society.

At the end of my speech, I would like to express my gratitude to the people who accompanied us to organize and hold this conference. I would like to appreciate my colleagues at the Iranian National Museum of Technology, the conference scientific and executive committees, and my dear colleagues inside and outside Iran who worked hard to hold this conference. I would like to thank Mr. Alberto Garlandini, the President of ICOM International, Mr. Ech-Cherki Dahmali, the CIMUSET President, and Mr. Ahmad Mohit Tabatabaei, the President of ICOM Iran, who did everything to hold this conference.





Ech- Cherki Dahmali

CIMUSET - Chairman

Dear friends and colleagues

I'm very proud again to welcome you to the CIMUSET 2020 annual conference postponed to 2021 for the first time in our organisation because of the Covid 19- pandemic which has had a major effect on our lives.

The theme chosen for our 48th Conference was "Museums and Environmental Concerns, New Insights" to offer CIMUSET members the opportunity to present the contribution of Science and Technology Museums to climate change discussions.

For the first time in CIMUSET history, this conference was held in a hybrid format.

I would like to thank our active member the Iranian National Museum of Science and Technology (INMOST) for the great work accomplished by the its team for the success of this special conference in spite of the pandemic restrictions.

In 2016, the CIMUSET board took the decision to extend the perimeter of its activities by including additional geographical regions. In 2017 our conference was held for the first time in Africa (Rabat, Morocco) and now in Iran because our members want to know

more about Iranian technical science and the science and technology heritage and try to understand the perfect combination between science and technology in the Islamic Civilization.

The theme of this conference was proposed by INMOST. In CIMUSET we find it a suitable topic because we believe that museums should be implicated in all issues, which concern their society, especially the question related to climate change.

Moreover, some CIMUSET members, like the technical and industrial open-air museums, are more concerned by the climate change issues. we also encourage the transformation of old industrial sites to open eco-museums to be a model for the protection of the environment.

Finally, I would like to express again my gratitude to the Iranian National Museum of Science and Technology team, ICOM Iran and other partners of this conference. I wish you a pleasant reading of the CIMUSET 2020 conference publication, and see you in our next conferences in the National Technical Museum of Prague in August 2022 and in the National Aviation Museum of Korea in October 2023.





Alberto Garlandini
President of ICOM

Dear friends and colleagues

As president of ICOM, I am particularly pleased to address CIMUSET Tehran. I would like to congratulate CIMUSET and its chair, "Ech Chekri Dahmali", ICOM Iran, the Iranian National Museum of Science and Technology, the Ministry of Science and, the Academy of Sciences of the Islamic Republic of Iran for organizing such an inspiring conference on museums and environmental concerns.

Your annual conference comes at a pivotal moment. The COVID-19 emergency has brought on enormous new challenges and exacerbated some of the old ones. While some museums are reopened with limitations many others remain closed. As we slowly emerge from the pandemic, we have both the opportunity and the duty to build back better. Beyond mere recovery, we must reinvent ourselves and re-imagine the museum of the future. I am confident that the museum of the future is already being built. Every day museum professionals are creating new connections with their communities and experimenting with innovative forms of cultural engagement and approaches to conservation. The pandemic has dramatically increased inequality in accessing heritage and participating in cultural life.





Kidong Bae

Chairperson of ICOM ASPAC

Distinguished guests and colleagues,
I am in greatly honored to make a congratulation on this special conference of "museums and environmental concerns, new insights" which is taking place in Tehran, and hosts by ICOM CIMUSET and ICOM Iran. Societies in Asia have experienced many environmental disasters and serious environmental change lately and the concern rapidly to climate change caused by CO2 due to social change in this region. In this regard, it is one of the most relevant themes for museums in Asia for thinking about the sustainability of our society in the future. "Environment", is the foremost important issue for the life of human kind at every stage of human evolution. We are living in the environment and survived by all kinds of resources in our environment; however, men's technology has changed the relationship between the environment and man and has endangered human survival in modern days due to all kind of man-made pollution. Air pollution and the increase of CO2, plastic waste, water contamination etc., would make this global unfavorable for any species in this coming Anthropocene. Biological sustainability is the most crucial issue in global society. What museum can do for this solution of a human crisis? I believe that the solution to the crisis in modern days and future shall be found in human intelligence constructed through the long experience of nature in the human past. Museum as a heritage house is the collective intelligence which has been built up with all memory and knowledge about adapting to nature and overcoming unfavorable environmental changes in human history. With the wisdom of heritage, museums to create a message of warning to the public about the current environmental crisis and the future of human beings through all kinds of museum practice; exhibitions and education, etc.





Seyyed Ahmad Mohit Tabatabaei
ICOM Iran-Chairman

The science museum's contribution to the development of the human future and their role in nature protection and preservation is necessary for a peaceful world.

I would like to express my gratitude to the President of the International Council of Museums (ICOM), Mr. Alberto Garlandini, Mr. Dahmali, CIMUSET Chairman and President of ICOM ASPAC, Mr. Bae. I am also so grateful to Dr. Jalili and his colleagues at the Iranian National Museum of Science and Technology of Iran for holding this conference on COVID-19. The theme for CIMUSET conference "Museums and environmental concerns, new insights" is chosen to remind us that museums of science and technology preserve tangible and intangible human cultural heritage and natural heritage and introduce and express human cultural and natural landscapes. This type of museum presents the natural and cultural perspective of their land. Their task is not only to collect, but also to introduce. They have to play an active role in promoting the knowledge and sustainability of

their homeland. With this new understanding of science and technology museums, they are considered an appropriate partner for earth and nature management.

A partner who knows better than any other institution what is necessary for the next generation to preserve, maintain and disseminate. Globalization and its crises, climate change, and natural and social issues have highlighted the role of museums in social sustainability.

The science museum's contribution to the development of the human future and their role in nature protection and preservation is necessary for a peaceful world. This conference is an opportunity to discuss and exchange opinions on the museum's role in facing environmental and natural crises. Looking at past experiences, the Tokyo Agreement about nature and the environment protection by science and technology museums, the United Nations acts on sustainable development, which is the ICOM goal will be very fruitful.

The role of museums in a world with greater social justice, equality for individuals, and the preservation and sustainability of the environment as a home for cultural heritage is essential. I hope that the results of this conference will be fruitful for the forthcoming General Assembly of ICOM in Prague.

Thanks again to CIMUSET, the Iranian National Museum of Science and Technology, and the the International Council of Museums (ICOM) colleagues.





Zahra Ojagh
Conference Secretary

Tell Environmental Concerns and share your Insights

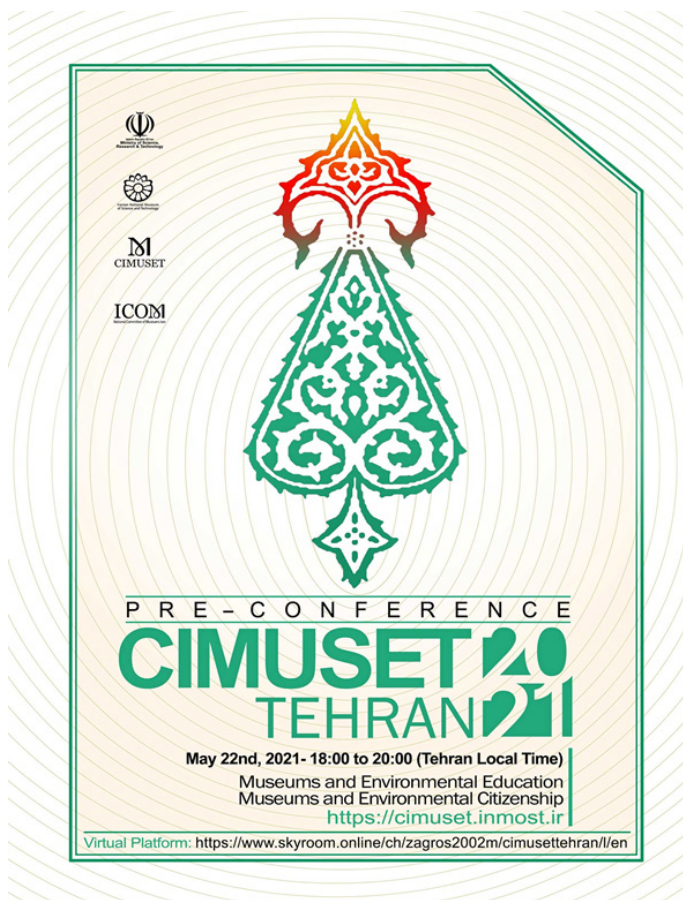
The theme of CIMUSET 2021, "Museums and Environmental Concerns, New Insights" takes us to the core of the living, the Earth. We only have one Earth that gives us the joy of living, having children, tasting, smelling and touching. Museums are one of the principal means to make sense of the earth as an issue for the public. Museums represent Earth and Environmental challenges in different ways. They provide stories, narratives and exhibitions to create an understandable language for communicating with people.

As Iranians, we perceive museums as the watchdogs of past heritage and an educational aid tool. However, they also shape the future and paint it for us. Museums, especially science museums, can help people understand the future and change their expectations of museums.

There is a crisis on Earth. Plants, animals, humans, and in short, life-giving genes are in danger. All parts of society must take action and in the meantime, museums need to think about their structure and function. I think the language they choose to communicate with people affects both their product and their production.

Science museums are not just mechanical transmitters of science. They are popular science creators, they need to apply different aspects and use various forms of the language. This is because there are many ways science to society. Using this language allows us to find new insights into Earth and its concerns. At CIMUSET 2021 in Tehran, different languages from different people come together to discuss environmental concerns and develop new insights.





Pre-conferences

 <p>PRE-CONFERENCE CIMUSET 2021 TEHRAN</p> <p>May 22nd, 2021- 18:00 to 20:00 (Tehran Local Time) Museums and Environmental Education Museums and Environmental Citizenship https://cimuset.inmost.ir</p> <p>Virtual Platform https://www.skyroom.online/ch/zagros2002m/cimusettehran/en</p>	<p>Mohammad Darvish Head on Environment Committee in Iran Branch of UNESCO Title: Museum and Environment Reciprocal Services</p>	
	<p>Mr. Arash Yousefi Head of Education at Department of Environment Title: Environment Literacy Education in Iran</p>	
	<p>Dr. Miskhatullah Pakistan Museum of Natural History, Islamabad – ICOM Pakistan Title: Museums and Environmental Education</p>	
	<p>Bahman Izadi Desertology Researcher Title: Ecological Studies, Natural Heritage(Features) Registration in National and International Heritage Database. An Approach to Conserve Our Land Values</p>	
	<p>Dr. Mohammad Medadi Paleontologist, Director-General, Natural History Museum and Genetic Resources of the Environment Department Title: The Role of Natural History Museums in Education of Biodiversity Concepts</p>	
	<p>Yasaman Esmaili Master of Science (MSc) Architecture - Design Computing, University of Arizona Title: Sarzourzouma Project. New Look at Traditional Method of Reforestation for Hara Forests- Guran, Qeshm</p>	
<p>Assoc.Prof. Ceren Karadeniz Title: Museums and Environmental Education: Insights of Turkish Museum</p>		

Pre-conference 1



PRE - CONFERENCE 2

CIMUSET 2021 TEHRAN

JULY 25TH, 2021- 18:00 to 20:00 (Tehran Local Time)

**Museums and Sustainable Environment
Museums and Environmental Citizenship**

Virtual Platform: <https://www.skyroom.online/ch/zagros2002m/cimusettehran//en>

Sahila Jali Head of Department of Cultural Studies and Communication, IICS	Zahra Oligh Head of Department of Cultural Studies and Communication, IICS	Khosro Sayeh-Talebi Prof. Forest Research Division (FRD) Research Institute of Forests & Rangelands (RFR) International Affairs	Jytte Thordahl Associate Professor, Department of Energy in Denmark	Elina Najafi Majid Associate Professor, Faculty of Science, Department of Biology, School of Zoology, Azarbaijan University of Medical Sciences, Tabriz, Iran	Melane Savarimutu Head of Curator - Deutsches Museum Nürnberg	Ahmad Nudlun Associate Professor of Art Research Group, Faculty of Art, Shahed University, Tehran, Iran	Sarah Malik PhD Student in Art Research, Faculty of Art, Shahed University, Tehran, Iran	Parisa Panahi Associate Prof., Research Institute of Forest and Rangelands	Laura Ronzon Head of Collections - Museo Nazionale Scienza e Tecnologia Leonardo da Vinci, Milan	Nasrin Fakhr Head of Education - Department of Iranian National Commission for UNESCO

Logos: UNESCO, ICOM, CIMUSET

Pre-conference 2

PRE - CONFERENCE 3

CIMUSET 2021 TEHRAN

**Museum Exhibition about Environmental Issues
Museums, Environment and Emergent Crises (Covid 19)**

September 12, 2021- 18:00 to 20:00 (Tehran Local Time)

<https://cimuset.inmost.ir>

Sahila Jali Head of Department of Cultural Studies and Communication, IICS	Zahra Oligh Head of Department of Cultural Studies and Communication, IICS	Nataran Shojai Kaveh MSc in Plant Protection, President's Counselor in Genetic Resources and Biodiversity Management, Head of the Department of Agricultural Zoology, World CBD, Iran National focal Point for Global Taxonomy Initiative, Conservation, Awareness and Participation	Mohsen Moridi-Neyestanek Iranian Research Institute of Plant Protection, President's Counselor in Genetic Resources and Biodiversity Management, Assistant Professor in Biotechnology in Food Technology Research Department & High Microscopy Insect Museum (HIMM), Head of the Department of Agricultural Zoology, World CBD, Iran National focal Point for Global Taxonomy Initiative.	Arash Javanmehr Khooi Associate professor University of Tehran	Parisa Abdolali PhD Student in Art Research, Faculty of Art, Shahed University, Tehran, Iran	Samuel Franco Arce Samuel Franco Arce Executive Director Casa K'oyun Cultural Rescue Center Antigua Guatemala	Majid Labbar Khaneiki Associate professor and researcher at the University of Augsburg in Germany, scientific advisor to the director of the International Center on Dams and Hydropower Hydropower Structures, (UNESCO-ICHS).	Kamalz Moshagh Gohari Faculty member of the Department of Architecture and Restoration and Assistant Professor of Sistan and Baluchistan University

Logos: UNESCO, ICOM, CIMUSET

Virtual Platform: <https://www.skyroom.online/ch/zagros2002m/cimusettehran//en>

Pre-conference 3



Keynote Speakers



Hugues De Varine

Hugues de Varine is a former director of ICOM (1965-1974) and a consultant in local and community development (1975-2013).

He is specialized in the use of cultural and natural heritage as resources for development, through various experimental community museums projects in France, Italy, Portugal and Brazil. He published, among other titles, "La culture des autres" (1976), "L'initiative communautaire" (1991), "Les racines du futur" (2002), "L'écomusée, singulier et pluriel" (2017).

and its evolution, Museum Prospect, at Sorbonne University. He also teaches museology at the Ecole du Louvre. He previously directed the Musée Royal de Mariemont in Belgium (from 2002 to 2010) and chaired the International Committee of Museology of ICOM (ICOFOM). He has published numerous articles and books in the fields of museology, cultural economics and cultural mediation.



"Museums and Environmental Education: Insights of Turkish Museums"

Ceren Karadeniz

Ceren Karadeniz is an Associate Professor at Ankara University. She prepared her Masters thesis on children museums and science centers in the context of interactive museum education. During her graduate studies, she participated in several programs as an intern and museum volunteer at Frankfurt Children Museum, Hamburg Children Museum and Miami Children Museum, USA. In 2010, she started Ankara University Fine Arts Education Doctorate Program and continued her research on museology.



François Mairesse

He is a museologist and professor of cultural economics who holds the UNESCO Chair on the study of museum diversity



In 2012, she worked as an exchange student at Goldsmiths College Cultural Studies Department in England. She completed his doctoral thesis on Museum and Cultural Diversity in 2015. In 2017, she conducted research on the new generation of bay museums in the United Arab Emirates. Karadeniz, completing the Master Program in Başkent University Museology with a thesis on Jordan Museums in 2021, continues to work on museum education, new approaches to museum studies and cultural diversity in the museum.

•UNESCO Emergency Preparedness and Response Unit.



"Culture Can Heal "

Samuel Franco Arce

- Executive Director Casa K'ojom Cultural Rescue Center Antigua Guatemala/
- Sound Recording Engineer-Videographer
- Member of ICOM DRMC, Disaster Resilient Museums Committee
- Conveyor of Blue Shield Guatemala
- Member of the Board of National Committee of UNESCO "Memory of the World" Program
- ICCROM Trainer and Consultant on Sound and Image Collections and then bullet. First Aid to Cultural Heritage in Times of Emergencies
- Partner of Prince Claus Fund – Cultural Emergency Response Network





Nayer Tahoori

Assistant Professor, Department of Art,
Science and Research Branch, Islamic
Azad University

“Isfahan: A Museum of Nature and Art”



Monir Kholghi

Associate Member of the Research
Institute of Cultural Heritage and Tourism
of the I.R. of Iran

**“A Review on Legal Protection of Natural
Heritage in Iran”**



Workshops

LIVE

سیموسیت ۲۰۲۱
تهران
CIMUSET ۲۰۲۱
TEHRAN

کارگاه مجازی شماره ۲ | Virtual Workshop 2



Kaveh Yazdifard
Innovation Designer
کاووه یزدی فرد
مربی نوآوری



Henry McGhie
Founder of curating tomorrow
هنری مک گی
بنیانگذار موزه‌داری برای فردا

title: Design Thinking for Better Public Experiences of Art/Culture
موضوع: تفکر طراحی برای تجربه‌های عمومی بهتر از هنر/فرهنگ

November 8th, 19:00 - 21:00 | ۱۷ آبان ۱۹۰۰-۲۱:۰۰

<https://www.skyroom.online/ch/zagros2002m/cimusettehran//en>

CIMUSET ICOM National Committee of Iran Ministry of Culture and Higher Education Ministry of Science, Research & Technology

LIVE

سیموسیت ۲۰۲۱
تهران
CIMUSET ۲۰۲۱
TEHRAN

کارگاه مجازی شماره ۱ | Virtual Workshop 1



Seyed Mohammad Beheshti
Architect and Iran Expert
سید محمد بهشتی
معمار و ایران‌شناس



Ahmad Mohit Tabatabaei
ICOM Iran- Chairman
احمد محیط طباطبایی
رئیس ایکوم ایران

جایگاه موزه‌های علوم و فناوری در تعریف جدید موزه‌ها
Science and Technology Museums in New Definition of Museums

November 7th, 19:00 - 21:00 | ۱۶ آبان ۱۹۰۰-۲۱:۰۰

<https://www.skyroom.online/ch/zagros2002m/cimusettehran//en>

CIMUSET ICOM National Committee of Iran Ministry of Culture and Higher Education Ministry of Science, Research & Technology

LIVE

سیموسیت ۲۰۲۱
تهران
CIMUSET ۲۰۲۱
TEHRAN

کارگاه مجازی شماره ۳ | Virtual Workshop 3



Asal Shakeri
Multidisciplinary Designer and Educator
Title: Together, to the World Rescue!
عسل شاکری
طراح تجربه و مدرس
موضوع: با هم، به نجات جهان!



Zahra Ojagh
Head of CSC in IHCS
Title: Science Communication
زهره اجاق
رئیس گروه مطالعات فرهنگی و ارتباطات IHCS
موضوع: ارتباطات علم

November 9th, 20:00 - 22:00 | ۱۸ آبان ۲۰۰۰-۲۲:۰۰

<https://www.skyroom.online/ch/zagros2002m/cimusettehran//en>

CIMUSET ICOM National Committee of Iran Ministry of Culture and Higher Education Ministry of Science, Research & Technology

Virtual Exhibitions

Evidence for Two Hundred Thousand Years of Human-Animal Bond in the land of Iran



Cultural commonalities of the history and nature in collaboration with the Iranian National Commission For UNESCO, ICOM Iran, National Museum of Iran, and Iranian National Museum of Science and Technology
November 7-11, 2021
gallery.irunesco.org

CIMUSET Tehran 2021
<https://cimuset.inmost.ir>



Cimuset Art Show by Selva Ozelli



Selva Ozelli is an environmentalist and expresses this sentiment as an artist, author and lawyer.

In her Art in the Time of Corona – Recovery Roses series of art shows which is on exhibit at the 48th International Committee for Museums and Collections of Science and Technology (CIMUSET), Selva explores whether Climate Change caused by carbon emissions might be one reason for such a terrible global COVID-19 pandemic scenario.

The CIMUSET is a scientific committee of the International Council of Museums (ICOM) is composed of museum professionals from the fields of science and technology who will discuss how Science and Technology museums can address the climate emergency issue via education and exhibitions.

Selva prepared the following art shows for this conference:

- NetZeroArtShowbySelvaOzelli:https://www.youtube.com/watch?v=q63Y_4LDjXE&t=187s
- World Science Week Art Show 1 by Selva Ozelli: <https://www.youtube.com/watch?v=gjdle0IQIHQ>
- World Science Week Art Show 2 by Selva Ozelli: <https://www.youtube.com/watch?v=CCFui7MaTWY>
- These art shows were selected in UN Art Contests and published in the 2021 United Nations Guide as well as exhibited at CUHK Jockey Club Museum of Climate Change and Solidarity Shows COVID-19 by World Health Organization (WHO) & Create 2030 and numerous other United Nations Conferences, Museums and NGOs. For more information www.talenthouse.com/selva-ozelli/about.



Robert R. Janes

He is a museum scholar-practitioner, Editor-in-Chief Emeritus of Museum Management and Curatorship, a Visiting Fellow in Museum Studies at the University of Leicester (UK), and the founder of the Coalition of Museums for Climate Justice. Janes has a Ph.D. in archaeology and has worked in museums for 45 years as a director, consultant, author, editor, archaeologist, board member, teacher, volunteer, and philanthropist - devoting his career to championing museums as important social institutions that can enhance the well-being of individuals and communities. His latest book is Museum Activism (with Richard Sandell) and his museum publications have been translated into ten languages.



Robert R. Janes
Founder and Co-Chair Coalition of Museums for Climate Justice

Robert R. Janes is a museum scholar-practitioner, Editor-in-Chief Emeritus of Museum Management and Curatorship, a Visiting Fellow in Museum Studies at the University of Leicester (UK), and the founder of the Coalition of Museums for Climate Justice. Janes has a Ph.D. in archaeology and has worked in museums for 45 years as a director, consultant, author, editor, archaeologist, board member, teacher, volunteer, and philanthropist-devoting his career to championing museums as important social institutions that can enhance the well-being of individuals and communities. His latest book is Museum Activism (with Richard Sandell) and his museum publications have been translated into ten languages. He lives in Canmore, Alberta, Canada.

Cimust.inmost.ir 7-11 November

Panels



Museums and Environmental Education

Session Co-Chairs:
Akram Ghadimi Arash Javanshir

lecturer:
Laura Ronzon:
Director of Collections at the Leonardo da Vinci Museum of Science and Technology, Milan, Italy
"Behind an Exhibition: Historical Perspective in the Narratives of Science and Technology Museums"
Mohammad Medadi:
National Natural History Museum, Department of Environment, Tehran, Iran
"An Overview of Natural History Museums in Iran and Their Role in Education of Biodiversity Concepts"
Akram Ghadimi:
Associate Professor in National Research Institution for Science policy (NRISP)
"The Role of Museums in Formation of Society's Belief toward the Environment Importance"
Mishkat Ullah:
Associate Curator/Treasurer ICOM-Pakistan Zoological Sciences Division Pakistan Museum of Natural History, Islamabad-Pakistan "Museums & Environmental Education"
Klaus Stauber:
ICOM Germany
"Museums Facing a Planetary Emergency"
Jytte Thorndahl:
Senior Curator at the Danish Museum of Energy
"Plans for a New Sustainable Museum of Energy in Denmark"

November 7th, First Session: 15:00-17:00 | ۱۷:۰۰ الی ۱۵:۰۰ آبان ۱۶۰۰



Museums and Environmental Citizenship

Session Co-Chairs:
Mojdeh Akhavan Sadreddin Taheri

lecturer:
Yasaman Esmaili:
Master of Science (MSc) Architecture - Design Computing, University of Arizona "Sarzuruma, A New Look at Traditional Methods for Rehabilitation and Revitalization of Hara in Gouron Village, Island"
Arash Yousefi:
Head of Education at Department of Environment
"Environment Literacy Education in Iran"
Mohammadreza Norouzi:
Museum & Science center Designer "Museumification of a City according to Urban Environmental Aspects. Case study: Designing a Water Museum on Valiasr St. in Tehran"
Maliheh Mehdi Abadi:
Faculty Member of the Research Institute Cultural Heritage and Tourism
"Aged Trees of Iran and the Culture of their Safeguarding"

November 7th, Second Session: 17:00-19:00 | ۱۹:۰۰ الی ۱۷:۰۰ آبان ۱۶۰۰





Jebrael Nokandeh Manijeh Hadian

Lecturer:

Khosro Sagheb-Talebi

Research Institute of Forests and Rangelands (RIFR), Agricultural Research, Education and Extension Organization (AREEO) "Hyrcanian Forests as an Outdoor Museum and Environmental Concerns"

Parisa Panahi

Associate Professor, Research Institute of Forest and Rangeland
"People and National Botanical Garden of Iran"

Elnaz Najafi Majd

Ege University, Faculty of Science, Department of Biology, Zoology Section "Public Awareness Activities and its Impact on the Conservation of Threatened Species, Azarbaijan Mountain Newt, Neuregus crocatus, in Iran"

Jalal Shirazi

Associate Professor of Entomology, Iran Plant Protection Research Institute, Department of Biological Control
"Biological control in Hyrcanian Forests (Iran): A Classic and Neoclassic Approach"

Parnian Ezati, Pardis Ezati

ICOM Members, Founder of Self-Learning

"Self-learning in the mirror of nature"

Mitra Khorasanian, Kimia Amini

ICOM member, Curator

"Dolls and Rain-Seeking Rituals"

■ November 8th, Third Session: 12:30-14:30 ■ ۱۴:۳۰ آبان ۱۴۰۲



Alireza Gholinezhad Ahmad Mohit Tabatabaei

Lecturer:

Manijeh Hadian Dehkordi

Assistant Professor in Research Institute of Cultural Heritage and Tourism (RICT) "Green Museum: A New Approach to Preserve Museum Collections in Iran: Challenges, Requirements and Policies"

Maziar Qaseminejad

Qeshm Island Masterplan Project Coordinator & Environmental Planner Expert, JICA Project Team
"An Effort to Preserve Cultural and Natural Heritage in Qeshm Through the Gouren Shipbuilding and Sailing Museum"

Nasrin Fakhri

Head of Education Department at Iranian National Commission for UNESCO
"Role of UNESCO in Environment Conservation"

Melanie Saverimuthu

Head of Curation Deutsch's Museum Nurnberg

"Discussing Utopia and Dystopia of Future Technologies"

Sara Soltani, Farzaneh Baharlou

"Green Management Indicators in Iranian University Museums: Provide Indicators for Alzahra University Museum"

■ November 8th, Fourth Session: 14:30-16:30 ■ ۱۶:۳۰ آبان ۱۴۰۲



Ruhollah Mohammadi Yusef Mansour Zadeh

Lecturer:

Mohsen Mofidi-Neyestanek

Iranian Research Institute of Plant Protection(IRIPP): Assistant Professor in biosystematics, Insect Taxonomy Research Department & Curator of Orthopteroidea at Hayk Mirzayans Insect Museum(HMIM), Head of the Department of Agricultural Zoology "Hayk Mirzayans Insect Museum"

1.Ahmad Nadalian 2.Sareh Malaki

1. Assistant Professor of Art Research Group, Faculty of Art, Shahed University, Tehran, Iran
2. PhD Student in Art Research, Faculty of Art, Shahed University, Tehran, Iran

"The Challenges the Dr. Nadalian Museum Faces Promoting Sustainable Development on Hormoz Island"

Samane Ghamar

Master of Graphics

"Exploring the Importance of the Environment in Environmental Graphics the American Museum of Natural History"

Kambiz Moshtagh Gohari

Faculty Member of the Department of Architecture and Restoration and Assistant Professor of Sistan and Baluchistan University "Sistan's Windmill, A Sustainable Technical Mechanism Based on Accurate Climate Knowledge"

Majid Labbaf Khaneiki

Researcher, University of Augsburg, Germany

"Qanat System and its Cultural Landscape in Iran"

Farahnaz Yeganeh, Kimia Amini

ICOM Member, Curator

"Museums of Science and Environmental Exposure with a Classic and Modern Approach"

Sara Kariman

Research Expert at SaadAbad Cultural and Historical Complex

"Archaeological Museums and Improving Public Understanding of Environmental Issues"

■ November 9th, Fifth Session: 13:00-15:00 ■ ۱۳:۰۰ آبان ۱۴۰۲



Rasoul Vatandoost Naser Rezayi

Lecturer:

Rajib Nath

Curator at Birla Industrial & Technological Museum, Kolkata, India.

"Environmental Education in Museums - A Hybrid Approach"

Nastaran Shojaei Kaveh

MSc in Petrology, Director of Geoscience Museum of Mashhad (GMM) "The Role of the Geoscience Museum of Mashhad (GMM) in Environmental Protection: Conservation, Awareness and Participation"

Jessica Norberto Rocha

In collaboration of: Leticia Carvalho de Mattos Marinho, Marcelle Pita de Sousa do Carmo, Willian Vieira de Abreu, Gabriela Sehnem Heck and Taíde Thomaz

"Accessible Virtual Exhibitions of Brazilian Science Museums: Mapping Themes, Strategies and Challenges"

Parisa Abdollahi

PhD in Conservation and Restoration of Cultural Properties from University of Art, University Lecturer

"ICOM Iran Conservation Commission and its Activities During COVID-19 Pandemic"

Arash Javanshir Khoei

Associate Professor, University of Tehran

"Covid 19 and Climate Changes"

Elnaz Rajabian

"Aknoon" Gallery Manager

"Museums and Galleries in Pandemic Times"

■ November 9th, Sixth Session: 15:00-17:00 ■ ۱۷:۰۰ آبان ۱۴۰۲

Abstracts

"Behind an Exhibition; Historical Perspective in the Narratives of Science and Technology Museums"

Laura Ronzon

Director of Collections at the Leonardo da Vinci Museum of Science and Technology, Milan, Italy

Remembering the roots of science and technology museums in national and international fairs can help to better understand the unresolved relationship of our museums with the environmental issue. Selected examples from the recent Behind the Exhibit publication. Exhibiting science and technology at world fairs and museums of the twentieth century (curated by E.Canadelli, M.Beretta and L.Ronzon) will highlight how this tradition has permeated the narratives up to the second half of the twentieth century and still today challenges our effort to be relevant institutions.

"An overview of Natural History Museums in Iran"

Mohammad Medadi

National Natural History Museum, Department of Environment, Tehran, Iran

Less than a century has passed since the establishment of the first museum of natural history in Iran. However, the quantitative and qualitative development of museums has been significant. There are currently various types of natural

history museums in Iran such as: natural science museums, zoological museums, herbariums, Eco parks, field museums, botanical gardens and specialized museums. In this study, by investigation of the history of the natural history museums in Iran, its historical trend divided into 6 periods in the last hundred years including: the period of mixing with hunting, the period of academic activity, museums under the Ministry of Jihad Agriculture, establishment of natural history museums by DOE, establishment of natural history museums by municipalities and private collections. The function of the National Museum of Natural History has also been discussed with a focus on education and research in the field of biodiversity.

"The role of museums in formation of society's belief in the importance of the environment"

Akram Ghadimi

Associate Professor National Research Institution for Science policy (NRISP)

Today, environmental crises threaten life on Earth. For the survival of mankind and the protection of the environment and to face the challenges, public belief in the significance of preserving the environment for the world future is important. Various tools can be used to create public respect to the environment. According to ICOM, "A museum is a



non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment”.

Thus, museums, by preserving the cultural heritage of nations, play a key role in cultural exchange, the development of mutual understanding, cooperation and thinking together among the people. The purpose of this paper is examination the role of museums in shaping public belief in the importance of the environment and seeks to answer this question;

How can museums contribute to the belief of community on the importance of the environment? In this article, we use the descriptive-analytical method.

At present, museums, in addition to their traditional role, can cultivate purposeful thinking in individuals by utilizing new methods of interaction, which increases the public's belief. Accordingly, by considering three important elements including easy communication, purposeful communication and up-to-date communication leads to raise interaction between people and environment and promote of it's in important among nations. It can be seems that museums have a unique role in recognizing the importance of the environment to society. In general, museums as a scientific center can make the insights and ideas of environmental protection into public belief in attractive ways through education, exhibitions, scientific visits, holding scientific meetings related to the environment and other programs.

“Museums & Environmental Education”

Mishkat Ullah

Associate Curator/Treasurer ICOM-Pakistan
Zoological Sciences Division
Pakistan Museum of Natural History,
Islamabad-Pakistan

It is becoming increasingly evident that people learn a lot about environment and science outside the formal education system. A wide range of resources facilitate general public science learning including, museums, national parks, internet, social media, libraries, friends and family. In formal education curriculum, relatively a little time is devoted to environmental conservation education. Natural History Museums (NHM's) could assist abridging this gap by developing programs relevant to students and general public learning. General public visits to NHMs can raise awareness and engagement in environmental conservation through powerful experience in permanent exhibits halls, theme based temporary exhibition, public programming, education programs, sustained mentoring and training programs. Museums achieve this by draw public attention to recent declines, extinctions and threats; highlight actions and solutions using specimens, 3D models & exhibits, photos, videos, dioramas and interactive. It is need of hour to engage public in biodiversity research and conservation in NHMs by developing Citizen Science Programs that leads to develop collaboration between scientists and citizen volunteers. This will help expand scientific data collection, provide access to scientific



information, encourage community engagement and equip public with information, skill and tools to make informed decisions. Specialized site based or online training courses for students, teachers, researcher and practitioners (wildlife, Forests, Customs and environmental protection agencies). NHMs should adopt new digital approaches like, collection digitization and sharing with global networks; mobile phone based social media engagement interaction and participation; 3D image and animation use with artificial intelligence; android based websites to interact with visitors and students; online trainings and outreach using Zoom, Youtube, Google Meet and Microsoft Teams for capacity development. NHM's are engaged in innovating, handling natural science collections and fighting at the forefront of addressing world major environmental issues. Our greatest achievement is to keep relevance connected with our future to necessities and drivers of our society.

"Museums Facing a Planetary Emergency"

Klaus Staubermann

ICOM Germany

Over the last century, humanity has benefited from remarkable improvements in health and in quality of life. Yet at the same time, we have been exploiting the Earth's resources in unprecedented and unsustainable ways. Our world is now changing rapidly under the influence of human behaviour: climate change and biodiversity loss but also pandemics are just some of the most dramatic manifestations.

These changes threaten the security of critical ecosystems and jeopardise the gains made over the past century in human health and well-being. As trusted sources of information and sites of transformative engagement, museums can and must play a role in addressing these issues. How should museums reinvent themselves in the face of a planetary emergency? How should we prepare ourselves for increasingly frequent extreme weather events and social unrest? What is the role of our collections and how can they be protected, in the face of global changes and also local disasters? What new roles could our institutions, and ICOM itself, play in the age of Fridays for Future and Extinction Rebellion? This presentation will summarise the findings of the conference held in 2020 by ICOM Germany, ICOM Greece and ICOM Cyprus, especially regarding future scenarios.

"Plans for a new sustainable Museum of Energy in Denmark"

Jytte Thorndahl

Senior Curator at the Danish Museum of Energy

The next ten years will be crucial for the destiny of the green changeover. The next ten years will provide still more challenges, but also new technological innovations.

There is a great need to understand, share knowledge, motivate young people to think and act in a sustainable way in their choice of study and in the settings for a very important part of



Danish history. We can hardly wait to see this development coming.

Thus, there is a need for a strong and modern Museum of Energy, the sooner this museum is ready to open the better it will contribute to the great change into renewable energy, new habits of conduct in eating, transportation, recycling etc. The creation of the New Museums of Energy will fulfill many needs, and by choosing a sustainable and circular economic design, the museum will show the very best within sustainability as well in its content and its architectonic design, and in this way underline the Danish ability to think in a holistic way. We will combine old and new in a sustainable way in the creation of a new and renovated Danish Museum of Energy. I will tell you about the plans in my paper.

"Sarzurzuma, a New Look at Traditional Methods for Rehabilitation and Revitalization of Hara in Gouron Village, Island"

Yasaman Esmaili

Master of Science (MSc), Architecture Design Computing, University of Arizona

Sarzurzuma is the name of a reef in the mangrove forest of Hara. The reef is ecologically vital for this portion of the forest, protecting it from severe weather and waves. It is also home to several local plant and bird species. Sarzurzuma is also a vital economic source for the community of the village. The community takes tourists to this location for daily visits and overnight stays and tourism is one of the most

important sources of income for the village. Unfortunately, due to global warming and disturbance by boats, the reef is eroding.

Studio chahar in collaboration with Gouron village Cooperative and volunteers from Gouron, is looking at and applying strategies for slowing down the erosion rate, introducing a new type of sustainable eco-tourism for Sarzurzuma and designing new pavilion structures as refuge spaces for the tourists, inspired by local crafts and boat-building techniques. As erosion control strategies, the goal is to create a living shoreline by tree pruning, planting, placing loose shell bags, and wood structures/fencing on the shoreline.

"Environment Literacy Education in Iran"

Arash Yousefi

Head of Education at Department of Environment

Environment literacy in the form of an important concept is known as the output of environmental education in the world. The difference between environmental education and environmental literacy education is that environmental education is a kind of fundamental process that aims at the output and results of education, while environmental literacy understands the relationship between natural systems and social systems.

An environmental literate person has the art of problem solving, critical thinking, and efficient decision-making skills to



gauge all aspects of an environmental problem.

According to various scientific sources, environmental literacy includes four components: knowledge, skills, inclination and behavior.

Learning in the objective context, linking concepts, providing skill capabilities and arousing the conscience of individuals are the four main axes of optimal environmental literacy education and according to these four axes, the most important point to be considered in designing a curriculum in the field of environmental literacy Becoming and coherence between the mentioned axes. The best time to institutionalize environmental literacy and build its belief in the community is childhood, and schools play a fundamental role in this regard.

The most important actions of the Environment Protection Organization in the development of environmental literacy are: preparation and compilation of special educational content for children and preschool educators and implementation of related training courses, production of environmental literacy educational content and providing appropriate educational assistance facilities for educators and students , Cooperation with the Ministry of Education to include materials related to environmental literacy in textbooks and curricula of different educational levels and preparation of textbooks "Man and the environment" ,holding camps and free student visits to museums of natural history and biodiversity And national parks and protected areas throughout the country, attracting student's participation in environmental

protection by implementing one-hour cove environment projects with the ranger, implementing a green management plan with a consumption pattern reform approach, conducting competitions and knowledge festivals Education, support of student centers and environmental organizations, cooperation with the Ministry of Science, Research and Technology to require students to provide a course on environmental knowledge.

"Museumification of a City according to Urban Environmental Aspects. Case study: Designing a Water Museum on Valiasr St. in Tehran"

Mohammadreza Norouzi

Museum & Science center Designer

Environmental issues and specifically climate change can undoubtedly be considered the most important issue facing modern human beings today that has affected and endangered the lives and survival of all living things. There are Numerous solutions to deal with this issue. Researchers believe that the main source of all these solutions is education. Theories of education have undergone fundamental changes in recent years and have made the process of education more and more clear to us by resorting to cognitive and philosophical theories. It is these new pedagogical theories that show us that museums are one of the best places to learn. Museums seen to be made to teaching, more than to preserve valuable historical treasures. The most important advantage of museums is



"active learning" and "personalization of learning" as two effective tools for education. Using these two tools, which are embedded in museums (and museum designers and museum operators must consciously reinforce these two identities), a third factor also contributes to the museum's informal education. Hyperconnectivity is a key and important point that brings effective museum education to the people and confronts them with the museum immediately. Hyperconnectivity creates a more direct, broader, and more direct connection between museums and the public, exposing the effects of informal museum education in everyday citizen life. In the water project of Valiasr Street Museum, an attempt has been made to build a museum on Valiasr Street using these three tools and considering the theories of design and education. A museum without walls and without any distance from people's daily activity. A museum that is not an obstacle to the normal life of citizens and has the maximum impact on them. The intended effects of this type of museum are to create sensitivity to the category of water and its changes in nature through human activities. In addition, efforts have been made to introduce the design of the "Museum Water" on Valiasr Street as a model for the design and implementation of "museums in the city." Finally, in this type of urban museum design, an effort is made to minimize intrusion and occupation in the urban spaces. The most important thing to do to design this type of museum is to find and read the water signs in the city, emphasize these signs and display data to complete or emphasize those signs. This set of activities can be an important

part of a museum in the heart of the city that complements the content of a local and limited museum and communicates well with the public.

"Aged Trees of Iran and the Culture of their Safeguarding"

Maliheh Mehdi Abadi

Faculty Member of the Research Institute Cultural Heritage and Tourism

Iran's history shows Iranian's reverence for the environment, water, soil, air, trees and animals. This has been presented in religious books and instructions and has been existing in the culture and daily life of Iranians till today. In the arid and semiarid climate of Iran, maintaining a tree is difficult and in order for it to be able to live for centuries, needs special technology (such as aqueducts or special irrigation methods) and continuous care. This article aims to deal with the safeguarding of ancient Iranian trees based on beliefs and to examine the impact of changing them on safeguarding or destruction.

"Water Crisis and Curatorial Emphasis: Reimagining the National Museum of Iran for Climate Action"

Mohammad Hekmat

Director of The House of Tehran

At the present time, many museums are undergoing cultural transformation to overcome the neutral status and become dynamic institutions that are more socially relevant to diverse communities. However, the idea of



addressing environmental issues is yet to become common in museums. The pressing challenge of the climate emergency forces us to ponder more practically the role museums could or should play. The paper aims to identify factors that would impact the curatorial practices in relation to the socioenvironmental concerns at the National Museum of Iran, particularly the water crisis in Iran. It explores the conflicts between neutrality and the community engagement approach in the principles of museum decolonization. The study contributes to a better understanding of how the museum is being transformed. There is no quick solution to the environmental challenges being faced today, however, museums as socio-cultural institutions can play a key role in climate action. Although the National Museum will not be solving the complex issues, it might set a powerful conversation for how this matter can unfold across the society over the coming years.

“Hyrcanian Forests and Environmental Concerns”

Khosro Sagheb-Talebi

Research Institute of Forests and Rangelands (RIFR), Agricultural Research, Education and Extension Organization (AREEO)

Hyrcanian Forest is the richest terrestrial ecosystem in Iran which illustrates the past of the northern part of the country not only from a natural science point of view, but also from historical and cultural aspects. The most

outstanding feature of the Hyrcanian (Caspian) region is the broad-leaved deciduous forest with some exception of conifers, which ranges in altitude from sea-level to 2,800 m above sea-level. The primary function of these forests, other than wood production, is supportive and environmental: they play a vital role in the conservation of soil and water resources and keep nature at balance on these susceptible steep mountain slopes. Rapid urbanization and industrialization, intensive grazing, over-utilization of forests for firewood production and farming in wooded areas are the most environmental concerns in the region.

“People and National Botanical Garden of Iran”

Parisa Panahi

Associate Prof., Research Institute of Forests and Rangelands, Agricultural Research, Education and Extension Organization (AREEO), Tehran, Iran

Botanical gardens are living collection of plants set aside for the purposes of ecological study, adaptability programs, conservation of endangered species, education and promote environmental awareness. Design and construction work of National Botanical Garden of Iran was began in 1968 in an area of 145 ha located on the southern slopes of Alborz mountains, Northwest of Tehran, so far, the garden maintains, over 20 plant collections comprising 4000 native and exotic species. National herbarium of Iran with more than 150,000 specimens, the palaeobotanical collection with more



than 1100 samples of plant fossils and wood fossils, natural resources gene bank of Iran with 47,000 accessions from 4000 wild plant and insect museum with about 200 unique and rare species from all over the world are the other parts of the NBGI. Every day a large number of people, especially students, researchers, and the general public visit these collections. Therefore, the role of the NBGI in promoting public awareness and education is very important.

“Public awareness activities and its impact on the conservation of threatened species, Azarbaijan Mountain Newt, *Neurergus crocatus*, in Iran”

Elnaz Najafi Majd

Ege University, Faculty of Science, Department of Biology, Zoology Section

Neurergus crocatus is known as Lake Urmia Newt or Azerbaijan Mountain Newt, listed as “vulnerable-VU” by the IUCN Red List of Threatened species. This newt inhabits the southeast of Turkey, northern Iraq and northwest of Iran. Despite the significance of its conservation, there is almost no data about its life history, exact distribution range, ecology and population status. This may be attributed mainly to geographic inaccessibility, permanent ethnic tensions, and decade-long military conflicts.

Extensive field studies were carried out on the potential range of *N. crocatus* and data on habitat and microhabitat variables, water quality, and population size/density was collected to identify

the ecologic aspects of its life and also to identify/evaluate threats and manage conservation strategies.

The anthropogenic destruction of habitats is a major threat to species survival and a significant cause of global species extinction. The most notable threat to this species is habitat loss due to the divergence of the creek to irrigate cultivated land, drainage and water conduit for surrounding communities, pollution, road works, droughts and floods. Taken together, all of these single threats can lead to the decline and extinction of species populations throughout their range. The myth and superstition based negative attitudes of humans towards the species and other amphibians are also a threat. Most people develop negative attitudes and even persecute them as useless or harmful animals. Killing newts by the thought that they are poisonous, plucking vegetation inside the spring that animal laying eggs on them in order to use the water source by locals is one of the unintended consequences of the issue. The education about the nature of this harmless and rare species, their importance and their role in the ecosystem was another focus of our project. As the main threat to these animals is the result of human activity and changes in their habitat, it is very important to raise awareness about this precious species and ultimately contribute to the survival and protection of its populations.

To this end, face to face educational sessions were held in public places in the villages or in the picnic area and educational brochures and info-



cards on species were published and distributed to villagers, students and travellers visiting the area. Training sessions were held in elementary and secondary schools to introduce the harmless species and describe the importance of conservation of the bio-indicator species.

"Biological Control of Box Tree Moth, *Cydalima perspectalis*, in Hyrcanian Forests"

Jalal Shirazi

Associate Professor of Entomology, Iran Plant Protection Research Institute, Department of Biological Control Box Tree Moth (BTM), *Cydalima perspectalis* (Walker) (Lep Crambidae) was first reported about 4 years ago from Iran. Since then, it has seriously damaged hyrcanian box trees in the north forests of the country. To control the pest larvae, some urgent measures including application of Bt, botanicals and IGR products have been practiced, however, results are not satisfactory. Reasons included irregular distribution of box trees in the area, limitation of access to highlands and equipment and labor scarcity. After finding the preliminary affirmative lab results of native egg and larval parasitoids activity on the pest, a study was carried out on its biocontrol program. The selected parasitoids were mass produced in Amol Biocontrol Research lab. Releases were made based on the pest life stages and population status. Preliminary results revealed that released natural enemies were able to locate and parasitize the pest. In average, multiple

releases of *Trichogramma* sp. resulted in 63.6 and 42.80 percent parasitism of the pest eggs. Similarly, 23.07 and 9.09 percent larval parasitism occurred after 1st and 2nd releases of *Habrobracon* herbator, respectively. Considering the results obtained in the current study, biological control of *C. perspectalis* certainly is the only solution to ensure the integrity and solidarity of the hyrcanian forests environment.

"Self-learning in the mirror of nature"

Parnian Ezati, Paradise Ezati

ICOM Members, Founder of Self- Learning

Ms. Shakhanom Moradi was born in the "Hoozmanan" Nomads in South of Kermanshah County in 1958. In 1975, she moved to Kermanshah City with her family due to the difficulties of seasonal migration, advancements in technology, and some other reasons including the educational progress of kids.

Having benefited from the gifts of migration, local knowledge of the elders in the tribe, and the beautiful nature of Zagros region during her lifetime, Shakhanom started missing her hometown. After this feeling of isolation and loneliness, she decided to reread, rehabilitate, and represent some parts of her nomad culture, relying on her strong will and the local knowledge and art hidden in her heart and hands. That was why she started making nomad dolls, which were extinct more than 40 years ago. According to Shakhanom and other nomads, the cultural background of some of these



dolls dates back to the ancient festivals of "Tamanye Baran" literally meaning "wishing for the rain". The ceaseless efforts of Shakhanom has resulted in creation of more than 80 nomad dolls, some in the human figure and some in domestic and wild animals' figures. From the spring of 2013 on, in an attempt for a better introduction of some parts of nomad culture, Shakhanom Moradi started drawing some creative paintings of the nature, lives, stories, and festivals of nomads, with no training or assistance; this attempt resulted in drawing more than 24 paintings by the spring of 2014. During that time, she was also involved in making different types of handicrafts in sizes smaller than the real ones. She has taught her skills of making nomad dolls and small-sized handicrafts to other women in her area too. Among other purposes of Shakhanom and her family, we can mention her aids for the reproduction of her hometown nature. She hopes she could help vitalize and revitalize the oak trees through attributing some parts of her and her students' income gained from the sales of their achievements.

In Ordibehesht 1393 (April-May 2014), in the exhibits of cultural heritage week and the international days for biological and cultural diversity, the International Council of Museums of Iran (ICOM) welcomed the cultural and artistic achievements of Ms. Shakhanom Moradi and also her student, Ms. Darya Mirzaee, in an attempt to support the plan "sustainable local support and preservation of art, culture, and nature of Kermanshah through empowerment of local women". The works of this artist

(Ms. Moradi) have been displayed in more than 10 art exhibitions including those held in Niavaran Palace, Iranian Artists Forum, National Museum of Iran, Tehran Museum of Contemporary Art, Golestan Palace, Golestan Cultural Center, Bahman Cultural Center, and Arasbaran Cultural Center.

Kaniz Abbas Panah, 68, living in Hormoz Island, has got married for three times and is the mother of 13 children. Kaniz and her mother both were married at the age of 7. At that young age she would serve as the maidservant of the other two wives of her husband. She leaves no stone unturned to make a living. She, beside some other women, is even involved in the job of fish drying for the fertilizer factories. She has always smiled at the endless miseries of her life. She has reflected a different interpretation of her time in her unique and amazing paintings. She has participated in group exhibitions of Iranian Artists Forum for Self-trained Artists Society of Iran alongside Dr. Ahmad Nadealian since 2013 and her works have been displayed there.

"Dolls and rain-seeking rituals"

Mitra Khorasanian & Kimia Amini

ICOM member, Curator

Iran has long been plagued by drought, as Darius in his inscription in Persepolis Pd D paragraph 3) asks Ahuramazda to protect Iran from drought and lies. Iran according to reports recorded up to fifty years ago, rain-seeking rituals were occasionally performed in many



parts of Iran, and in many of these areas, they are still performed. Rain-seeking rituals include making a doll or choosing a person and assigning a symbolic identity to it, holding a bouquet, pouring water, singing a prayer and singing a request for rain, receiving gifts from locals, baking bread or soup, marking bread or Another food is to hit someone who has a sign in his share until a guarantor is found and some other ritual acts are performed according to the geographical location. Dolls and ritual dolls are more than decorative objects; as part of the earliest relics, they have played many roles in society. This study deals with the functions and aesthetics of Iranian dolls and puppets in art and humanity to show their importance. In The discussion also introduces and aesthetics of Iranian dolls of rain-seeking rituals in geographical parts of Iran to show the difference and importance in the face of each climate.

"Green Museum: A New Approach to Preserve Museum Collections in Iran: Challenges, Requirements and Policies"

Manijeh Hadian Dehkordi

Assistant Professor in Research Institute of Cultural Heritage and Tourism (RICHT)

Excessive consumption of energy resources, environmental interventions and climate changes have brought about some concerns for the global community. The emergence of sustainability and green movements is the byproduct of these preoccupations. Types of activities undertaken by museums to protect and

preserve artefacts and their missions in terms of education and cultural transfer in societies require them to be much costlier than other centers and consume much more energy as well. Increase level of familiarity with the environmental effects led to changes in operation procedures of cultural heritage institutes including museums. Over past two decades and in light of introduction of the sustainability into the sphere of museums, a new concept namely the green museum emerged across the world. According to the concepts of sustainability and green museums, the present study aims at presenting some results of a project entitled "evaluating the air quality at museum environments: on the way to green museums" that began in Iran in 2016. Then, based on the results of the study, researchers have delved into details of challenges, strategies, and requirements of Iranian museums for performing green activities or continuing the green journey.

"An Effort to Preserve Cultural and Natural Heritage in Qeshm Through the Gouron Shipbuilding and Sailing Museum"

Maziar Qaseminejad

Qeshm Island Masterplan Project Coordinator & Environmental Planner Expert, JICA Project Team

The purpose of the project is to safeguard a group of fading skills that can potentially increase the income of households in the South of Iran based on their natural capacities.



Each year, over two millions people visit Qeshm Island that teach people how to respond to this demand considering the next generation.

The coastal areas of Gouron Village are located on the verge of the mangrove forests that labelled by several national and international designations. Many of Qeshm locals know that mass tourism threatens their natural resources, so they are about to diversify their tourism products.

The local government of the island by supports of Qeshm UNESCO Global Geopark, has already dedicated 63 hectares of the terrestrial and marine areas to a museum through Gouron Corporation.

The project ran between 2016 and 2018 as one of the JICA (Japan International Cooperation Agency) pilot projects. In order to learn how to marketize traditional skills, a young villager was dispatched to Japan. He started a big job in return by encouraging some of his peers to establish a corporation to implement a series of activities. This resulted in thousands of tourists visiting the open-air museum to learn about the vernacular arts and industries related to sailing and shipbuilding in their village. The museum generates a bunch of golden opportunities to experience team working, to make new networks, to sell products to visitors, to compete healthily with neighboring villages, and to think of more ambitious projects for the island and the Persian gulf region. I was impressed by their improvement with barely hands. The number of their members rocketed to 99 from 39 within a couple of years, and they planned great projects based on their

natural adventures. With love they are promoting their traditional ships called Lenj or Lanch, reminding the importance of mangrove marine forests, explaining historical maritime routes, and selling small handicrafts, while thinking of other purposeful ideas.

One of their wonderful ideas is to build and launch a -100feet-length sailing wooden ship, exactly as it was built for the centuries, and called it Sandbad Boom. The project is planned, but yet not started due to financial constraints. This project can breathe hope to the sails, recall their glorious history, revitalize Iranians' industrial and commercial legacy, and make clusters of jobs for locals whose identity is blended with the sea.

In this open-air museum, there are five shipyards that rarely construct or overhaul a ship. At this time, only one of those shipyards is building two orders.

There is no wind to fill their sails and experts believe that this engineering heritage totally vanishes within one or two decades if the tide-over continues. Museums like schools or mosques are expenses for a society, so it makes sense if the governments support them on behalf of public benefits.

"Role of UNESCO in environmental conservation"

Nasrin Fakhri

Head of the education- Department at Iranian National Commission for UNESCO

The risks of Climate change, different types of pollution, loss of biodiversity, etc., push UN and UNESCO to



support Member States to address environmental sustainability and take climate action via different programs like the World Network of Biosphere Reserves or the Local and Indigenous Knowledge Systems Program (LINKS). Focusing on Environmental management system, reducing carbon emissions, waste, protecting biodiversity and promoting urban agriculture and the most important, creating awareness and education for Sustainable Development are among the UNESCO's missions in this field.

"Discussing Utopia and Dystopia of future technologies"

Melanie Saverimuthu

Head of Curation Deutsches Museum Nürnberg

"The future museum" - will expand the thematic portfolio of the Deutsches Museum about the aspect of "future technologies" in the context of ethical and social questions. Focusing on the dialogue about technological developments and relevant future issues as well as the presentation of the future as a "space that can be shaped". Future does not just happen, we can create it. But to be able to shape it we do have to know about the new technologies and ideas that may change the world we are living in. We need to know about the consequences that might come by using or abandoning some of these new technologies. The future museum offers a space where visitors can face new developments, learn about their possibilities and

discuss hopes and fears coming with these future technologies.

"Green Management Indicators in Iranian University Museums: A Framework Proposal"

Sara Soltani, Farzaneh Baharluo

Objective: To present the proposed indicators of green management in Iranian university museums

Research Method: The present study has a quantitative approach and an applied goal type. Also, the method used in this research is a descriptive survey. The current study population was also experts of Iranian university museums. In this study, a questionnaire was used to collect data. First, a questionnaire was designed based on the indicators provided by Green Metrics for green management in universities. The questionnaire was then distributed electronically among the experts of the university museums. The results were ranked based on the Friedman test, and finally, based on the obtained rankings, the proposed indicators of green management were presented in the university museums of Iran.

Findings and Conclusion: The findings of the present study showed that Iranian university museums need different and specific indicators with the characteristics of the museum and at the same time in line with the global green management indicators of universities. Also, green management and its indicators in university museums have different dimensions in terms of space and architecture, equipment,



recycling management, transportation, and training, which requires short-term and long-term attention and planning. On the other hand, rapid climate change in Iran requires a policy that provides green management indicators to university museums in a standard and uniform manner. Most of the indicators examined by the research community are essential, but the degree of this importance varies among the indicators. Finally, the proposed framework of the present study is a suitable model for the implementation of green management programs and efforts to promote sustainable development in Iranian university museums.

“Environment sustainable through Knowledge management in Museums”

Marzieh Hekmat

Assistant professor in museology at art university of Isfahan

Neda Torabi Farsani

Assistant professor in tourism at Art university of Isfahan

The concept of sustainable development in developing countries is one of the main approaches to decision-making at the national social level. It is obvious that to achieve the principles of sustainable development, a society needs popularization and raising awareness. Since museums, due to the use of real objects and thematic exhibitions, can play an important role in knowledge transfer and knowledge management. This issue has a great impact when the museum and its institutional actions move towards sustainability. Nowadays, the environment, global

warming, drought, and biological challenges are the most challenging issues of sustainability. In this regard, museums can play an important role in the popularization of sustainable development issues. Museum visitors are people from the community who come to the museum according to their choice and motivation, thus raising awareness is one of their interests. This descriptive-analytical research attempts to investigate the role of museums in sustainable development with an emphasis on the environmental dimension.

“Hayk Mirzayans Insect Museum”

Mohsen Mofidi Neyestanak

Iranian Research Institute of Plant Protection (IRIPP): Assistant Professor in biosystematics, Insect Taxonomy Research Department & Curator of Orthopteroidea at Hayk Mirzayans Insect Museum (HMIM), Head of the Department of Agricultural Zoology

Iran owns a diverse biota due to its different climatic and topographic characteristics. It is located in the Palaearctic realm; however, some Oriental or Afrotropical elements influence its fauna. IRIPP was initially founded to combat agricultural pests and diseases. To know the fauna and flora, it began to collect and identify the species. Up to now, several natural national reference collections are deposited there. In 1944, young Hayk Mirzayans did a national faunistic study on the insects of Iran along with some Russian entomologists as research leaders. They collected tremendous



material. The insect collection was transferred to Insect Taxonomy Research Department within IRIPP and appeared as a museum, the same year. After more than half a century work, Mr. Mirzayans passed away in 1999 and the museum was named after him by the then Minister. Since then, the HMIM staff have traveled to every place of Iran to improve the museum. HMIM is now the largest insect collection in the Middle East with exceeding to 4.5 million specimens, 25,000 species, hundreds of types and exotic insects. Apart from researchers, interested students visit the museum, observe Iranian insects and ask their questions. The specialists might work on the main collections but general and public visitors are led to visit the general exhibition of IRIPP. These public visits are locked down due to the pandemic COVID-19, however, there has been few institutions that have provided online virtual tours for their students. The curators of HMIM are trying to provide a virtual HMIM.

“The Challenges of Dr. Nadalian Museum faces promoting sustainable development on Hormoz Island”

Ahmad Nadalian

Assistant Professor of Art Research Group, Faculty of Art, Shahed University, Tehran, Iran

Sareh Maleki

PhD student in Art Research, Faculty of Arts, Shahed University, Tehran

Museums have always been defined as a non-profit, permanent organization

serving the community that showcases tangible and intangible heritage. Dr. Ahmad Nadalian Permanent Museum and Gallery on Hormoz Island is a place that, in addition to displaying the works of this internationally known environmental artist, has exhibited the indigenous culture of Hormoz Island. The activity of the museum officially started in 2009 under the name of Art-residency. This place was in the old quarter of Hormoz city before it became an Art-residency and a museum for criminals, which after this change of use, became a place for teaching and promoting culture and art. One of the most important activities of Dr. Nadalian in this museum has been teaching painting with colored soils to the women of Hormoz Island. He first relied on environmental art for sustainable development on the island, which eventually led to social art. Evidence and documents show that before the environmental art festivals, the island's economy was associated with the red soil mine, which resulted in the most damage to nature, the least benefit to the local community, and the highest benefit to the exporter of raw materials. Of course, the use of soil for periods is reversed. The populist, record-breaking, and value-seeking view further overcomes the marvel of soil that has become credible over art itself. With the critical intervention of Nadalian and the replacement of imitation stone powder, this issue has been institutionalized to a large extent. At least everyone agrees that soil and minerals should not be extracted. But the main challenge is the needs of the local community itself. The museum is currently investing in the



next generation. Minimal welfare and cultural and environmental awareness will result in sustainable development. In this study, Activities of Dr. Nadalian Museum in Hormoz Island and its challenges in promoting sustainable development will be examined.

“Exploring the Importance of the Environment in Environmental Graphics the American Museum of Natural History”

Samane Ghamar

Master of Graphics

Environmental graphic as a part of the image of urban society, tries to simplify the information and functions of museum for its audience by inform and beautification perspective, with the aid of available elements and examples in the museum as training boards and attention to children and adolescents as well as promotional facilities and visual graphic elements to attract tourists. The most important task in this area is high speed messaging, message transmission, training and learning in order to protect the environment. This article examines the environmental graphic of the American Museum of Natural History, with the aim of recognizing the characteristics of the museum's environmental graphic design and recognizing the color, form, pictogram design indicators and design of the museum entrance and recognizing design features of stand, emphasizing education and promoting of culture and the importance of the environment from the perspective of museums; The research method of this article is

descriptive and analytical method and the method of collecting data is library and documentary based method as well as reliable sites which examine the effective role of environmental graphic in increasing tourism, museum order and routing, attraction and interaction between its audience and its solidarity in visual identity. The result of this research shows that the creative and coordinated approach of the designer with complete knowledge of the type of museum activity that is based on the environment, has caused a scientific and coherent interaction between audiences and foreign tourists, and this factor can be considered as the success of the designer in the environmental graphic of the American Museum of Natural History.

“Sistan's Windmill, A Sustainable Technical Mechanism Based on Accurate Climate Knowledge”

Kambiz Moshtagh Gohari

Faculty member of the Department of Architecture and Restoration and Assistant Professor of Sistan and Baluchestan University

The Sistanis were the first people who invented the Windmills. The water mill and the mills which were rotated with the power of animals has been known to man since ancient times. Since the first year's AD, Water mill, that is known itself as an Iranian-Indian invention, has been used in large parts of Iran, Central Asia, Asia Minor, and the Indian subcontinent. The question is; why the Sistanis invented the Windmill? The answer must be found in the



geography of Sistan. Deep knowledge of the climatic features of the habitat and the force of survive, have leaded the ancient people of Sistan to use the potential of the land smartly. Sistan on the one hand has the fertile plain of Helmand and on the other hand has -120day strong winds in summer. If you add this to climatic capability and the need to crush the grains, and the absence of any height difference in the Sistan plain, you will see that the Sistanis have no choice but to invent a mechanism that be powered by the wind. Invention a machine that could use renewable energy was happened in Sistan for the first time of mankind history. Using the wind for work create a mechanism that can be known as the first machine in history. A machine that is still present in the technology family despite various technical and economic developments. In the era of renewable energy, windmills have caused a large family of wind turbines. In this seminar, I will explain how this wind-based mechanism was invented.

"Qanat System and its Cultural Landscape in Iran"

Majid Labbaf Khaneiki

Researcher, University of Augsburg, Germany

Qanat consists of some shaft wells interconnected by a subterranean tunnel which drains out the groundwater seepage and conveys it onto the earth surface using a height difference between the two ends of the tunnel. Qanat as a technology establishes a

special relationship between humans and their environment, a relationship that underlies an intricate network of political, social, cultural and economic structures. This same network can be called the atmosphere of qanat civilization which is manifest in adobe architecture, handicrafts, traditional bazaars, orchards, etc. Knowing the role of qanat sheds a different light on many of the cultural phenomena in central Iran. For example, orientation of traditional streets and alleys in accordance with the direction of qanat running underneath, the layout of city districts and their correlation with qanat access stairs (Payab), etc. all allude to the structural and functional importance of qanat in this region. Qanats are not just some technical objects aloof and independent from rural and urban life. In contrast, qanats are like a network of veins spreading all over the body of city to bring life and prosperity everywhere, creating a special cultural landscape.

"Museums of Science and Environmental Exposure with a Classic and Modern Approach"

Farahnaz Yeganeh, Kimia Amini

ICOM Member, Curator

One of the most serious challenges facing the world today is climate change. 2021 has witnessed the profound impacts of the warming of the planet and climate events across the globe. Extreme weather, wildfires, floods, intense storms demonstrate that climate change is



happening right now caused by human behaviours. Unlike what we tend to think, it is not a distant phenomenon. Increases in global temperature, sea-level rise, natural resource depletion, desertification, drought, freshwater scarcity and loss of biodiversity (name a few) are threatening both the future of humanity and the whole planet on which we live.

Climate change is a complex and intertwined issue. It has cultural, political, technological, economic and scientific dimensions which are contingent on each other. Therefore, different sectors and organisations in a society have a role to play in tackling climate change. The cultural sector and cultural institutions including museums and science centres are not exempt. In fact, they have the potential and the capacity to not only inform and raise public awareness about the environmental issues and climate crisis but also to empower them by inspiring to think and formulate their own values/positions and encouraging them to take positive action for their future sustainable society.

This paper explores how climate actions are being practised in three science museums. It is necessary to mention that our scale is not comprehensive. We attempt to select museums trying to do things differently and have taken new approaches to their core activities. The Science Museum London, the National Museum of Emerging Science and Innovation (Miraikan) Japan, and the Climate Museum New York are the case studies. The different approaches, strategies, and methods these museums have taken and how they have incorporated climate change

in their practices and programmes are explored. The paper concludes how powerful platforms these museums can be to fight against the climate crisis and how vital the work of these museums is.

“Archeological Museums and Improving Public Understanding of Environmental Issues”

Sara Kariman

Research Expert at SaadAbad Cultural and Historical Complex

One of the main pillars of museums is responding to social issues and needs. Environmental concern is one of the demands and crises that human beings are struggling with today. Archaeological museums are mother museums that display many human achievements; Given the importance and pivotal role of these museums, it is important to study how these museums behave and work in the face of environmental issues. Archaeological Museums In this article, an attempt is made to examine how to interact with environmental issues in archaeological museums and to provide practical solutions to address this issue and improve public understanding of various aspects of this issue.

“Environmental Education in Museums - A Hybrid Approach»

Rajib Nath

Curator at Birla Industrial & Technological Museum, Kolkata, India.

Environmental issues and climate changes impact everyone, everywhere and all aspects of life. Though



environmental awareness in formal educational settings is quite a common practice nowadays, however, museums in non-formal educational settings have also undertaken activities / programs related to the environment protection & awareness. Science museums have been regularly organizing programs like nature study camps, popular talks, Nature Photography, Investigative Projects involving students, celebration of commemorative days like World Environment Day to increase the level of awareness about the environment among the public and particularly among the students. It may be noted that most of the programs conducted by the museums are in-house, conducted inside the museums or in-person, conducted in presence of the participants. However, during the pandemic, it is a challenge now to conduct the programs in-house or conduct them in-person as most of the museums are closed or even when they open up, we have to maintain covid appropriate behavior for the visiting public to the museums. In this situation, museums need to shift to a hybrid model for conducting such environment awareness programs. Museums will now have to transform some of their in-house programs into online mode. Birla Industrial & Technological Museum at Kolkata, India has successfully done that in the last one year during the pandemic situation. However, some programs were also conducted in-house by inviting a select group of students and conducted following social distancing norms. This hybrid model approach opened up new vistas for the museum and also increased the inclusiveness, resulting in a holistic environment education and awareness.

“The role of the Geoscience Museum of Mashhad (GMM) in environmental protection: Conservation, Awareness and Participation”

Nastaran Shojaei Kaveh

MSc in Petrology, Director of Geoscience Museum of Mashhad (GMM)

Advances in technology and human needs have led us to the increasing use of the earth's resources, the way in some places, even the morphology of the earth has changed, and as a result, the climate and life have been affected deeply. We have only one planet to live on. Do we have the right to sacrifice it for technology? On the one hand, we cannot stop the technological activities and ignore the effects they have on the planet. On the other hand, we cannot close our eyes to the proportion of this planet and life for children and future generations.

The geologists deal with the earth the most. They examine the Earth layer by layer. This is where the role of museums like the Geoscience Museum of Mashhad (GMM) comes into play. Museums are not legislators, but can inform people about their duties, responsibilities and their rights.

At the GMM, has defined three main tasks: Maintenance, awareness and participation. At first, earth science documents such as rocks, minerals and fossil samples are collected, especially in relation to the geological features of our country. The other important task in GMM is to inform people, especially the next generation. First we make them familiar with the earth and geological phenomena, in order to gain a better understanding of the earth, its valuable resources and the importance

of preserving it. Then for making sure they get the point, we have them participate in some activities (games& arguments ...), especially in schools.

"Accessible Virtual Exhibitions of Brazilian Science Museums: Mapping Themes, Strategies and Challenges"

Jessica Norberto Rocha

In collaboration of Letícia Carvalho de Mattos Marinho, Marcelle Pita de Sousa do Carmo, Willian Vieira de Abreu, Gabriela Sehnem Heck and Taáte Thomaz

The pandemic brought challenges to engaging science museum audiences. In Brazil, most of them have been closed for in-person visitation for over a year. Some museums created virtual strategies to continue their actions in science communication or intensified the ones already existent. However, virtual engagement and accessibility were still challenges for Brazilian museums that went deeper into the new scenario. This section presents the results of a survey carried out in 2021 about the virtual exhibitions of Brazilian museums and their accessibility strategies. To this end, we mapped the virtual exhibitions organized by the country's 67 museums listed in the Guide to Accessible Sciences Centers and Museums in Latin America and the Caribbean. Out of the 67 museums analyzed, only 30 have one or more virtual exhibitions, totalizing 101 analyzed exhibitions. Out of these, 88 provide some action or accessibility feature, with most being present only keyboard navigation features, 83. In addition, only 13 exhibitions

have subtitles in Portuguese, six offer windows or translation software for Brazilian Sign Language, and only five exhibitions have audio description resources. None of the analyzed exhibitions had all the assistive features of the analysis. Given that, we can see how it is still necessary to deepen discussions, assessments, and audience studies to improve online activities and involve even more diverse audiences in the actions of Brazilian museums and science centers.

"ICOM Iran Conservation Commission and its Activities During COVID-19 Pandemic"

Parisa Abdollahi

PhD in Conservation and Restoration of Cultural Properties from University of Art, University Lecturer

ICOM IRAN Conservation Commission, consisting of twelve specialized working groups, began its activities in the summer of 2017. With the spread of Coronavirus pandemic, the Commission's undertakings were not only limited but continued virtually. One major endeavor of the Commission during the Coronavirus pandemic was the preparation of a protocol on the "Recommendation, General Requirements, Hygienic and Technical Principles for Re-opening of Museums during Coronavirus Pandemic" in the summer of 2020.

Considering, concurrently and with greater sensitivity than before, two aspects of human life and human heritage, is the factor which may place this document and its content in an



exceptional position. Environmental characteristics that are recommended and implemented to protect human health may not necessarily be in same line with the conservation requirements of cultural heritage. Museum environment and regulations have always been defined and implemented in such a way that priorities are mostly given to the museum objects. But with the dominance of such a dangerous disease, which has endangered the lives of thousands of people around the world since its inception, new changes and modifications are needed, that may endanger the well-being of museum artifacts in exchange for the safety of the visitors, which, in its turn, is in conflict with the principles of heritage conservation.

In this document, prepared and formulated through collecting field data, cooperation of experts from various fields of conservation and restoration, and curators, as well as available international scientific sources, attempts are made to meet the requirements of two subjects; that is the conservation and preservation of cultural properties as well as general requirements, hygienic and technical principles both based on the importance of human life and cultural heritage. In this way, this document, along with other national and international texts, may help with the re-opening of the museums and historical and cultural sites, and in other words, could make the re-connection of people with their respected cultural heritage, an essential precondition for the conservation and preservation of world heritage.

“COVID-19 and Climate Changes”

Arash Javanshir Khoei

Associate Professor, University of Tehran

Environmental degradation and biodiversity loss may cause the conditions for an increase in the type of animal-to-human and vice versa zoonosis that may result in viral epidemics. According to the Human Rights Committee, environmental degradation is one of “the most pressing and serious threats to the ability of present and future generations to enjoy the right to life” and protecting the human right to life “depends on measures taken by States parties to protect the environment”. The COVID-19 response should respect, protect and fulfil rights to a healthy environment. They also contribute to pre-existing medical conditions, such as asthma, that make persons more vulnerable to viral infections. More than 150 countries recognize the right to a safe, clean and healthy environment in some form. The substantive elements of this right include a safe climate, water and sanitation, clean air, healthy and sustainably produced food, non-toxic environments, healthy ecosystems and biodiversity. These elements are prerequisites for human health and resilience in the face of illness and for reducing the risk of zoonosis and expansion of existing disease vectors. The COVID-19 pandemic should push us all to rethink our interactions with nature and wildlife. Around 60 percent of all infectious diseases and 75 percent of all emerging infectious diseases in humans, including



COVID-19, are zoonotic. On average, one new infectious disease emerges in humans every four months. Ecosystem integrity is the foundation of human health and development. Human-induced environmental changes modify wildlife population structure and reduce biodiversity, resulting in new conditions that favor particular hosts, vectors, and/or pathogens.

"Museums and Galleries in Pandemic Times"

Elnaz Rajabian

"Aknoon" Gallery Manager

During the COVID-19 epidemic last year, most galleries and cultural and artistic activities were shut down and all doors were closed to artists.

But we seized the opportunity to open a window for international cooperation. We are all aware that cooperation between countries in any field has its difficulties.

The Corona era ushered in a new way of working with cultural and artistic partners in other parts of the world. We were able to introduce the artists of that country and hold exhibitions with countries such as Austria, Poland, France and Romania in the style of "online artist".

Our activity was to link with the artist online and promote the exhibition that can be presented in the form of a video art installation video painting with the online and accurate supervision of the artist.

The artist was with us online during the exhibition.

This method became a new way of

holding exhibitions during the Corona era, when the artist could not travel to another country to display his works. A new way that in the absence of an artist in a specific format, we were able to continue artistic collaboration and face the borders of the world online! Let's open.



1- Hyrcanian Forests as an outdoor museum and Environmental Concerns

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Research Institute of Forests and Rangelands (RIFR), Agricultural Research, Education and Extension Organization (AREEO)

Abstract

Hyrcanian Forest is the richest terrestrial ecosystem in Iran which illustrates the past of the northern part of the country not only from a natural science point of view, but also from historical and cultural aspects. The most outstanding feature of the Hyrcanian (Caspian) region is the broad-leaved deciduous forest with some exception of conifers, which ranges in altitude from sea-level to 2,800 m above sea-level. The primary function of these forests, other than wood production, is supportive and environmental: they play a vital role in the conservation of soil and water resources and keep nature at balance on these susceptible steep mountain slopes. Several long-lived trees, some more than centuries old, could be found in the Hyrcanian forests. These individuals should be conserved in the natural habitats, like a museum in the nature. Unlike the indoor museums that the unique material must be protected in an enclosed and controlled environment and in case of damage they are not renewable, the old-growth trees are natural resources and renewable material that can keep their genetic characteristics. Unfortunately, rapid urbanization and industrialization (land use change), mining excavations, intensive grazing, over-utilization of forests for diverse purposes and farming in wooded areas as well as climate change are the most environmental concerns in the region.

Introduction

The southern limit of the Euro-Siberian region coincides with the southern coastal areas of the Black and Caspian Seas. The western area near the Black Sea is referred to as the Euxinian province, whereas the eastern, near the Caspian Sea, as the Hyrcanian province; they are separated by the Caucasus massif. Within Eurasia they present one of the very characteristic relic refugia for the mesophyllic tree and shrub flora (Browicz, 1989).

In Iran, the Euro-Siberian region is represented by the Euxino-Hyrcanian province. It is confined here to the coastal surroundings of the Caspian Sea and occupies three main habitats: alluvial flats of the coastal plain, the northern slopes of the Alborz Mountains, and the subalpine meadows of these mountains. The most outstanding feature of this area is the broad-leaved deciduous forest with some exception of conifers, which ranges in altitude from sea-level to 2,800 m above



sea-level.

The rather high number of species endemic to the Euxino-Hyrcanian province gives this forest type a distinctive character (Sagheb-Talebi et al., 2014). A very recent paleobotanical study (figure 1) based on the C14 and luminescence method in the central Alborz, Kojour region, located at almost 1,200 m.a.s.l. indicated that the oldest sedimentary layer in which fossilized broad-leaved plants were found dates back to $8,800 \pm 82,000$ BP (Montazeri et al., 2011). The Hyrcanian vegetation zone, also called Caspian forest, is a green belt stretching over the northern slopes of the Alborz mountain ranges and covers the southern coasts of the Caspian Sea. This area stretches from Astara in the northwest to the Gorgan vicinity in the northeast of Iran. Based on the latest data from the Iranian Forests and Rangelands Organization (Anon., 2008), this area is approximately 800 km long and 110 km wide and has a total area of 1.85 million ha comprising %15 of the total Iranian forests and %1.1 of the country's area. The Hyrcanian forest at lower altitudes contain a number of relict Arcto-Tertiary thermophilous species, such as ironwood (*Parrotia persica*), Caspian honey locust (*Gleditschia caspica*), Siberian elm (*Zelkova carpinifolia*) and false walnut (*Pterocarya fraxinifolia*) (Akhani et al., 2010).

The primary function of the Hyrcanian forests, other than wood production, is supportive and environmental: they play a vital role in the conservation of soil and water resources and keep nature at balance on these susceptible steep mountain slopes. Several long-lived trees, some more than centuries old, could be found in the Hyrcanian forests (figure 1). These individuals should be conserved in the natural habitats, like a museum in the nature.



Figure 1. Some features of old-growth trees and fossils of the Hyrcanian forests

Conservation issues

During the Tertiary Period and later forested areas remained intact along the southeastern coasts of the Black Sea and south of the Caspian Sea, and a number of plant archeologists consider them as relict ecological systems. Of the 80 woody species reported from the region, 45 species (ca %60) belong to the late Pleistocene. The extent of the Hyrcanian forests hardly changed during the entire Quaternary Period at least until the end of the Ice Age. During this time, the entire area was dominated by a single indicator forest system including various Arcto-Tertiary (northern) elements. During the ice ages undoubtedly the temperature-susceptible species got extinct in this area. It can be concluded that the climatic conditions and vegetation cover of the Hyrcanian region did not undergo major changes during the Quaternary Period (Shahsavari, 1997). This is the reason why several biogeographers consider the Caspian forests as an important refugium of temperate broad-leaved trees during the Quaternary glaciations (Zohary, 1973; Probst, 1981; Leroy and Arpe, 2007). Thus, the Hyrcanian forests are one of the last remnants of natural deciduous forests in the northern hemisphere. Native, endemic and endangered tree species include Caspian honey locust, false walnut, ironwood, Siberian elm, box tree (*Buxus hyrcana*), Caspian poplar (*Populus caspica*) and a few conifer species such as yew (*Taxus baccata*) (Sagheb-Talebi, 2000; Knapp, 2005). It is very important to conserve and protect these forests and the individual long-lived trees as ancient gene pool. In general there are two methods of

Conservation of natural resources

- In-situ that includes protecting the natural habitats line natural parks, protected areas and reserve stands,
- Ex-situ that includes transferring and protecting trees in the botanical gardens and arboretums, maintaining the dried plants in the herbarium and seeds in gene banks as well as cryopreservation.

In this manuscript we focus on in-situ method by recognizing special forest stands and habitats as well as long-lived trees with high dimensions in their natural habitats and performing individual, group and/or area protection. By this method we can protect the genetic resources and use the potential of renewing or regeneration ability to keep the material in a sustainable way. In other words, we create museum in the nature. The most advantage of this method is that we can replace the material with another live individual or with the new generation of the same genetic structure. Unlike the indoor museums that the unique material must be protected in an enclosed and controlled environment and in case of damage they are not renewable.



Environmental concerns

Rapid urbanization and industrialization (land use change), mining excavations, intensive grazing, over-utilization of forests for diverse purposes and farming in wooded areas as well as climate change and forest fire are amongst the main causes of deforestation and environmental concerns in this region (figure 2). One of the most significant impacts of this degradation is the depletion of epiphytic species in the region (Shahsavari, 1997). Over the last few decades, swift forest degradation has brought about a number of environmental, social and economical impacts including soil erosion, floods, degradation of farmlands and habitats, reduction of biodiversity and natural resources and air and water pollution. Manipulation of forest ecosystems has threatened a number of animal species such as fallow deer, roe deer, wolf, fox, wild cat, leopard, pheasant and trout.



Figure 2. Some threats to the fauna and flora of the Hyrcanian forests.

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2- Environmental literacy training in Iran (With the approach of educational function of museums and protected areas)

Arash Yousefi, Behrang Salajegheh

Environmental literacy refers to the knowledge of the principles and principles of environmental protection and close familiarity with natural landscapes and familiarity with natural life. Environmental literacy is recognized as an important concept, as the output of environmental education in the world, which has recently entered our scientific, social and educational literature. Environmental literacy has a fundamental but subtle difference with environmental education. While environmental education is a process-based process, environmental goals are based on output. Environmental literacy is the understanding of the relationship between natural systems and human social systems. Accordingly, an individual is environmentally literate who has the art of problem solving, critical thinking, and efficient decision-making skills to gauge all aspects of an environmental problem. This person can behave responsibly to solve environmental problems because he or she has acquired cognitive skills for making wise decisions. Accordingly, in various sources, four components of knowledge, skills, inclination and behavior

have been listed for environmental literacy. Thus, environmental literacy includes practices, activities, and emotions that are rooted in familiarity with and knowledge of the environment. Just as literate people are affected by their ability to read and write their identities, so are literate citizens internalizing the ability to interpret and act in favor of the environment? In general, environmental and education experts consider the main axes of optimal environmental literacy education to be based on components such as learning in the objective text, linking concepts, providing skill capabilities, and arousing the conscience of individuals.

Learning in the text, which is generally known as the most sustainable way of learning, makes it possible to understand a topic in relation to experience as well as in relation to other topics. Likewise, the active linking of concepts and phenomena with each other is an essential component of learning, the weakness of which leads to a misunderstanding of environmental issues. On the other hand, the transfer of knowledge and skills is an integral part of any environmental education program. Finally, stimulating and sensitizing students' consciences are another important issue that has unfortunately been excluded from formal education, often due to its connection to the private realm of knowledge transfer. The fact is that in designing any training program in the field of environmental literacy, these four aspects must be considered in an intertwined and coherent way. In this regard, the role and educational function of museums and protected areas in the use of various educational environments and a wide range of educational approaches for teaching and learning about the environment with a proper emphasis on practical activities and gaining first-class (personal) experiences. It is undeniable. Turning environmental protection into a mental belief and habit is the only way to ultimately preserve the environment. The best time to build such a belief is from childhood, and schools play a vital role in this. The key to success in environmental literacy education is teachers' knowledge, and it is difficult to expect that school students whose teachers are less aware of environmental issues will be able to acquire the skills needed to preserve nature and improve the quality of the environment in the region. Be yourself. To this end, the Environmental Protection Agency follows the following measures:

- 1- Implementing environmental-related training courses to empower school teachers and preschool teachers.
- 2- Producing environmental literacy educational contents and providing appropriate educational assistance facilities for teachers and educators as well as students.
- 3- Cooperating with the Ministry of Education to include materials related to environmental literacy in books and curricula of different educational levels.
- 4- Cooperating with the Ministry of Education to create human and environmental lessons in the 11th grade of high school.
- 5- Holding camps and (free) student visits to museums of natural history and



biodiversity and national parks and protected areas in all provinces of the country.

6- Attracting students' participation in environmental protection by implementing one-hour cove environment projects with environmentalists in schools in all provinces of the country.

7- Implementing a green management plan with the approach of improving the pattern of water, electricity, energy, paper consumption and waste recycling in schools in all provinces of the country.

8- Performing competitions, festivals and student educational programs on environmental occasions in all provinces of the country.

9- Supporting student centers and environmental organizations in all provinces of the country.

10- Cooperating with the Ministry of Science, Research and Technology to oblige the presentation of the course on environmental knowledge to the students of universities and higher education centers of the country.

In conclusion, for a generation whose school is closed due to air pollution, they hear about the problems of drought and water shortage from the media every day and face warnings about rationing water for eating and washing, put a lot of garbage in place. He sees his place of residence, education and entertainment and is faced with an accumulation of photos, videos and images related to the increasing destruction of the environment on the Internet, virtual networks, television and satellite, another slogan and naming a day from the calendar. It cannot be enough. This generation is thirsty for learning environmental literacy (concepts such as climate change, biodiversity, etc.), needs objective and obvious examples in the geography of their place of residence and seeks practical measures to solve problems and make life better and healthier.

3- The challenges Dr. Nadalian Museum faces promoting sustainable development on Hormuz Island

Ahmad Nadalian¹ , Sareh Malaki²

Museums have always been defined as a non-profit permanent organization serving the community that exhibited tangible and intangible heritage. Dr. Nadalian Permanent Museum and Gallery on Hormuz Island is a place that in addition to display the works of this internationally known environmental artist, has exhibited the indigenous culture of Hormuz Island. The building of the museum used to be a ruined, located in the old neighborhood of Hormuz. After

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renovation, it has officially started working as an Art-residency in 2009 and four years later in 2012 it has become the museum of Dr. Nadalian. One of the most important activities of Dr. Nadalian in this museum is teaching painting with colorful soils to the women of Hormuz Island. He first relied on environmental art for sustainable development on the island, which eventually led to social art. Evidences and documents show that before the environmental art festivals(2006), the island's economy was associated with the red soil mine, which was causing the most damage to the nature of the island and the least benefit to the local community. Of course, the use of soil has stopped for a while. Moreover, the populist, record-breaking, and value-seeking view overcomes the marvel of soil that has become credible over art itself. With the critical intervention of Nadalian and the replacement of imitation stone powder (with what?), this issue has been institutionalized to a large extent. At least everyone agrees that soil and minerals should not be extracted. But the main challenge is the needs of the local community, therefore the museum is currently investing in the needs of next generation. However, minimal welfare and cultural and environmental awareness will result in sustainable development. In this paper, the activities of Dr. Nadalian Museum in Hormoz Island and its challenges in promoting sustainable development will be examined.

Keywords: Hormoz Island, social art, local communities, sustainable development, Dr. Nadalian's Museum

Introduction

The concept of development in the minds of researchers and development economists has different measures, including increasing productivity, improving the quality of life, eliminating poverty and deprivation, improving the level of health services, solving the problems of unemployment and inflation, and providing economic and social needs can be noted. Today, the word development refers to the kind of development that looks at the world from the intersection of three economic, social, and environmental issues. Therefore, when we talk about art and development, we pay attention to the effectiveness and influence of art in these three categories; economic, social, and environmental. In recent years, one of the places that have attracted the attention of Iranians and the world due to its artistic events is the island of Hormuz. Hormuz Island, a salty dome with a wide range of colored soils, is one of the southern islands of Iran with an area of about 42 km, which is located at a distance of five and a half km from Bandar Abbas and 18 km from Qeshm Island. There are several salt mountains and caves on the island of Hormuz with high color diversity. The reason for this variety of colors dates to millions of years ago. When the deep-sea salt masses were light, it crossed faults and gradually brought with their minerals and rocks from the



subsoil. Gradually, a large amount of salt was washed away, and the color of the mountains became apparent. Iron oxides are found in Hormoz Island in different colors. The most famous soil of the island in the past was red soil or in the local dialect, Golk. The island has a population of near 6000 people, whose livelihoods provided them with years of fishing and maritime trade. Until the mid2001-s, employment in the Red Soil Island mine continued, but now the activity of this mine has been stopped for various reasons, especially environmental reasons (Abedini and Danehkar, 2006, p25).

There is ample evidence that prior to the closure of the Red-soil mine. The island's economy was associated with the mine, which resulted in the highest profits for raw material exporters and the lowest for the people of Hormuz. From the mid- 2001s, with the holding of environmental art events on Hormoz Island and the presence of artists to participate in these events, the economy of Hormuz Island gradually became associated with farming, to the point that today most of the islanders are engaged in tourism-related jobs. One of the artists invited to the first environmental arts festival on the island of Hormoz was Ahmad Nadalian, whose presence, residence, and activities on the island of Hormuz is one of the factors of cultural, social, economic, and ultimately sustainable development of the island. As it mentioned earlier, the main purpose of this study is to get acquainted with the challenges of Dr. Nadalian Museum in promoting and teaching sustainable development in Hormuz Island. In order to achieve this goal, the following question needs to be answered: what were the activities of Dr. Nadalian Museum in Hormuz Island? And what were the obstacles and challenges in the process of education and promotion of sustainable development in Hormuz Island for Dr. Nadalian.

Theoretical concepts

In order to answer the research questions, it is necessary first, to explain concepts such as art and development, sustainable development, social art, local communities, and the concept of the museum in the present era, and then look at the story of Dr. Nadalian in Hormuz Island and activities of the museum in the field of education and promotion of sustainable development and its challenges. Art and development: Art can serve as a tool to tackle racism, violence, the spread of AIDS, and the like. Art, in the age of globalization, allows society to preserve and share its culture. Art is an element of society's identity and can help preserve its heritage and history. This heritage not only strengthens culture but also raises awareness of cultural differences for people outside society. Evidence shows that art is a valuable tool in building economic capital, social capital, and cultural awareness, yet it is difficult to pinpoint this impact in measurable terms. Of course, it is a little easier to measure the economic impact of art on the development of society. However, it is also difficult to measure the creation of social capital and cultural awareness created by art in societies, as well as the impact of art on society itself. Assessing the role of art in the development of

society is associated with many methodological challenges. In these cases, in research that is done primarily based on individual's own reports; The measuring elements are unclear and almost no definite standard has been measured. For art to be effective in the development of society, individuals must design artistic activities for participants from a variety of backgrounds. This notion of elitism, reinforced especially by contemporary art may have a negative impact on the role of art as a tool in the development of society. The cooperation required in artistic activities and the exchange of information produced by art; is an effective tool to use in the development of society. However, art as a tool in this field has been neglected. The refreshing nature of art events, along with the lack of measurable results of its developmental effects, may have influenced the limited use of art in the development of society. Art provides enjoyable collective activities while enhancing economic achievement, increasing social capital, and preserving a community's cultural heritage. (Peters, 2004)

Social art: The existence of art within society emphasizes the concept of social art more than ever. The fundamental question is what kind of art a social art is? and what are its examples? Sociologists in general, consider all the art forms to be social and the result of social interactions; Because they believe that all fields in artistic creation have a social origin. From social infrastructure to all those institutions that support the arts and sponsor artists and their arts; It can be, therefore, emphasized that all the arts are social because they were created by men to communicate or gain experience. However, what is considered social art today has features that distinguish it from sociologist's general view of art and are rooted in the prevailing paradigms of the post-1960s. Muridi (2019, p73) believes that "social art is not art with social or political themes; It is an art with a critical function". "What critical art presents is not the image of poverty and deprivation and disease, but the display of human cruelty and indifference to each other and to common issues."

Sustainable development: "Development that meets the needs of the present age, without compromising the ability of future generations to meet their own needs."

Local communities: Communities or groups that have commonalities, especially socially, live in small towns and villages and are underdeveloped or less developed.

Museum: According to the ICOM Statutes, Article 3, Section 1: "A museum is a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, research, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment" (ICOM Definition of a museum, 2007). It goes without saying that the museum described in the 2007 Definition was still largely European in origin and from a time of colonial expansion; yet today, there are multiple entities in Europe and beyond identifying themselves as museums that may not fulfil all the requirements in the Definition.



Moreover, throughout the world, the social role of museums is gaining agency, and recent years have seen – in Latin America especially – the development of new, experimental museums that challenge the canon and prompt us to ask whether we can still insist on the museum is a permanent “institution” rather than a more inclusive kind of organization and whether the phrase “in the service of society and its development” is sufficient to evoke the role played by the museums of the new millennium? In the wake of political upheaval museums can witness pedagogical reformation, and a museum can be understood as a form of resistance (Brown & Mairesse, 2018, p 3).

Ahmad Nadalian

He was born in 1963 in Sangsar. He got his bachelor's degree in painting from the Faculty of Fine Arts, University of Tehran, and received his master's degree and Ph.D. from the Central University of the United Kingdom (USE). After graduating, he returned to Iran in 1995 and chose to live in nature.



During this time, he began carving on rocks in rivers and moved the bed of paintings from canvas to stone. He also exhibited his works on the Internet. At the same time, in addition to teaching at the university, he held environmental art festivals in various places, which brought a new wave of attention and interest in environmental art in Iran. Currently, many students and participants in these events have taken similar paths in their daily lives and have created works of environmental art and new arts in all parts of Iran and the world. By reviewing the resumes of contemporary Iranian environmental artists, attendance at these events has been recorded at least once. During his studies, Nadalian traveled to most of the provinces of Iran and has done many designs in these areas. Nadalian's works of art have been exhibited in many countries. Nadalian quotes Grande (2017, p6) "he is known for his various environmental works around the world" (Figure 1).

Nadalian Presence in Hormuz Island

If we are looking for the beginning of the formation of new arts in Hormuz Island, we should look for its roots in the event in December 2006. Its main activity was held in Hormoz Island. Initially, the Hormuzgan Visual Arts Association had planned to hold a three-day sand sculpture workshop at the invitation of Ahmad Nadalian. Because of his expertise in environmental art and stone carving, he suggested to the organizers to change the title of the workshop to Environmental Art, which would also include sand and rock sculptures. The workshop started in Bandar Abbas and various fields of environmental art and working with sand were done in it. When the artists went to the island of Hormuz, it was not possible to make sand and rock sculptures due to the restrictions on the intended location. Limited work was done in the form of stone arrangement, but Nadalian, due to the capabilities he saw in colored soils, changed the course of the workshop and suggested working with colored soil. More important than the colorful suggestion that Nadalian consciously took to function and reflect on the media was that he called the workshop a festival on his website and the ninth environmental art festival. He also suggested that the name of the festival be tied to the Persian Gulf to attract more media attention, and this sparked the event. The use of the Persian Gulf name and the large-scale English script was widely reported in the media. Nadalian was closely associated with the mass media and published an electronic magazine in two languages due to his participation in the Venice Biennial and his travels to various countries in those years. The news organization knew and was able to make good use of the media. A month later, in February, in coordination with the local artists of the Visual Arts Association, he brought a group of his students from Tehran to the island of Hormuz and promised that the island of Hormuz would become a winter base for environmental arts. In 2007, this trend continued. Two events were held in January and February. Since then, Hormuz Island has always been a place for artistic events.

Economy of Hormoz Island

The economy of Hormoz Island was dependent on fishing and red soil mining activities before the environmental arts events. At that time, soil was exported in the form of raw material, which had the greatest benefit to the exporter and the least benefit to the people of the island. Red soil exports did the most damage to the island's environment. But after the art events, the economic cycle shifted to tourism-related jobs and arts activities.

Dr. Nadalian Museum and Sustainable Development in Hormoz Island

In general, Nadalian's activities on the island of Hormuz, whose main base is the permanent museum and gallery of this international artist on the island, have led to many ups and downs in promoting and teaching sustainable development.



On Nowruz 2009, Nadalian bought an old house in the Old Bazaar neighborhood of Hormoz Island. The house was renovated with the cooperation of several students and artists under the observation of Dr. Nadalian. In the reconstruction of this abandoned house, which was a hangout for criminals, he paid attention to the relics of the previous residents of this place and kept some of them in harmony with the new space of the building. In fact, this reconstruction was in the form of works of art in the 25th Environmental Arts Festival, which changed the use of the abandoned building and the surrounding space. The result of this process was the adaptation of the surrounding environment to the use of the building. According to Nadalian: "There was no other way because the goal was to change the use with a small budget".



Figure 2

Dr. Nadalian's house became home to artists. The original purpose of the art house was to provide accommodation for artists, especially environmental artists. After a short time, due to reasons such as the sabotage of some artists of Bandar Abbas and the strictures of the representative of cultural heritage on the island, this place became a permanent museum and gallery for environmental art and social art of Dr. Nadalian. The Museum and Gallery of Ahmad Nadalian in Hormuz Island, exhibits the works of this internationally known, active environmental artists, in from of video clips?

In Hormuz Island, Nadalian focused on social art. Nadalian's art works preformed and exhibited in more than seventy countries across the globe. Tourists, by watching this clip, got acquainted with the historical, cultural, geographical and artistic backgrounds of the island. Samples of emerging handicrafts of women of Hormoz and Qeshm islands are sold in a part of the museum. In one othere part of the museum, we find photographs of the culture, nature, art and people of the island. One of the museums room is the artist's workshop and dormitory, which, in addition to his art tools, houses a number of local island dolls as well as fragments of marine animal remains. The wall of another room is completely dedicated to the examples of Glabton? embroidery and low embroidery of Hormoz women. These specimens belong to the folds of their

old and abandoned trousers that were thrown into the sea and were always accumulated in a part of the island. Nadalian brought these old and abandoned pieces to his museum and told their story as part of the native culture of Hormuz Island. In the other side of the same room, his carved stone seals can be moved on a piece of sand, which has caused the audience to interact with the work of art. One of the unique features of this museum is the collaboration of local people as museum staff. In the museum itself, the use of disposable and recycled materials in the interior design leaves marks and relics of its former residents. The red soil painted doors and walls, and a large palm tree in the courtyard of the museum gives it a very warm and harmonious look. Another feature that attracts the attention of most visitors is the artist's residence part. This part of the museum has been introduced in most famous international travel books of Iran in different languages. Many reputable international travel agencies visit this museum in their official program.

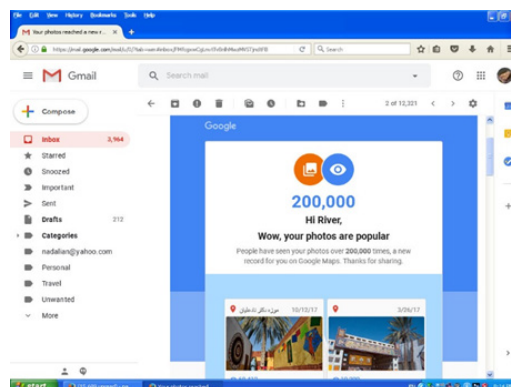


Figure 3

Museum and Women's Activities

The former artist house and current museum of Dr. Nadalian have provided employment opportunities for many women in recent years. In one of his notes?papers? speeches?, Nadalian states that after two years of working in the nature, he felt a huge difference between the nature and the quality of ordinary peoples life . He realized that the unemployment in Hormuz causes the extreme poverty and addiction on the island. His inference from environmental art is not the form of art that onlt pays attention to nature, it also considers men as part of the natural environment. Therefore, he chose to pay attention, not only to the living environment as his mission but also to the environment and the community.

He created job opportunities for women. For that, he had introduced and taught the local women how to paint with the local, natural material of the island. In 2008, Nadalian, voluntarily, taught women under the auspices of the relief committee how to prepare colored soils for painting and taught them how to paint with colored soils behind glass. Many women came to the museum to learn art. Today, there are workshops and houses on the island of Hormuz where women prepare in groups to sell paintings. Currently, women's handmade crafts are sold directly by themselves or their families on the island where tourists travel. Some of these works are also sold in the Museum. The surplus income from the sale of museum works is allocated to the education of talented girls who themselves or their mothers cooperate with the museum.





Figure 4

Today, Hormoz Island is also known as an island where women have managerial roles. Women are involved in tourism such as dining, eco-tourism, sales or even painting and gallery work. Bringing women to this stage of presence in society was a complex process, part of which was explained and implemented by Nadalian. At the beginning of his presence, none of the women were willing to stand in front of the camera. Selling was impossible for them due to cultural issues and prejudices of the islanders. Nadalian facilitated these obstacles with different tricks. Today, the women of Hormuz Island easily take souvenir photos with tourists, a phenomenon that still may not be accepted in some cities of Bandar Abbas and may lead to honor clashes.



Figure 5

Another trick he used to encourage women to sell was to stand in front of the pier as a salesman. He faced some serious problems, the day he and two of his students went to the pier to sell women's soil paintings, he got beaten by local rioters and all the works were broken. Nadalian repaired these paintings and sold them for more money by telling the incident.



Figure 6

He also suggested that participants in environmental art festivals visit the museum's neighborhood for accommodation and food. This led to the emergence of the first eco-tours and inns around the museum. Other actions by Nadalian include breaking the taboo of exhibiting women pants have turn it into an opportunity. The display of women's embroidered Glabton pants, as a local art, was not very compatible with the tastes of the Islander's men; But today, indigenous women themselves donate or sell these pants to the museum.



Figure 7



Row	Actions	Results
1	<p>1. Designing emerging handicrafts using natural elements and indigenous culture</p> <p>2. Teaching emerging handicrafts to women</p> <p>3. Production of emerging handicrafts by women</p> <p>4. Cooperation in the sale of emerging handicrafts by Nadalian and local women</p> <p>5. Creating new jobs through the process of producing emerging handicrafts</p>	Economic empowerment of local communities, especially women, through artistic activities
2	<p>6. Cooperation with the local community, especially women, in the performance of environmental art works such as Simorgh</p> <p>7. Cooperation of local communities, especially women, with each other in the production and sale of works of emerging art industries, handicrafts and other products of indigenous women by themselves in the community (of course, this cooperation was more competitive and the type of cooperation on the island was family)</p> <p>8. Encourage and satisfy women during social activities to be in front of the camera and show them in the media in various ways</p>	Social empowerment of local communities, especially women, and their presence in society through artistic activities
3	<p>9. Attention to traditional arts, legends and myths, local clothing through the display of local costumes (pants and burqa), local dolls, images of the culture and history of the region in Dr. Nadalian Museum and the use of local culture in emerging handicrafts</p> <p>10. Compilation of several books with illustrative images of history, culture of the mentioned areas by Ahmad Nadalian</p>	Cultural empowerment of local communities, especially women, through artistic activities
4	<p>The use of traditional art designs such as traditional clothing needles such as burqa and pachak in emerging art industries</p> <p>Designing images inspired by local myths, beliefs and myths such as Melmadas, Bibi-Asr, etc. in emerging art industries</p> <p>Use of environmentally friendly, often disposable, and environmentally friendly materials to create emerging handicrafts and artwork</p> <p>Using Indigenous Art Tools in Emerging Handicrafts, such as Using Henna Funnels to Paint Patterns in Emerging Handicrafts Instead of Using a Brush</p>	Influence of emerging art industries on indigenous women arts and indigenous culture
5	<p>The first eco-tours and inns were formed around the Dr. Nadalian Museum. To welcome artists participating in art events.</p> <p>With the increase of art tourism due to environmental art events, especially the holding of earthen carpets, which was the result of holding environmental art events, this type of tourism industry has grown in these areas.</p>	Development of ecotourism and tourism
6	<p>The first eco-tours and inns were formed around the Dr. Nadalian Museum. To welcome artists participating in art events.</p> <p>With the increase of art tourism due to environmental art events, especially the holding of earthen carpets, which was the result of holding environmental art events, this type of tourism industry has grown in these areas.</p>	Improving urban and neighborhood spaces
7	<p>Painting training and doing joint drawings with less interested people such as patients and people with addiction</p>	Social, cultural and economic empowerment of lesser-known people such as patients and people with addiction and the emergence of so-called self-taught painters
8	<p>Free education for children on environmental issues</p> <p>Performing performing and environmental arts with children to strengthen social skills</p> <p>Free drawing lessons for children</p> <p>Free English language training for children</p> <p>Replacing old dolls with new ones and gifts for children</p> <p>Launching a creative library for children</p>	Cultural and social empowerment of children

Table 1 - Summarizes the main activities of Dr. Nadalian in Hormoz Island and its results.

Row	Action	Challenge	the opportunity
1	Buy an abandoned house	It was a hangout for criminals and old people	It was rebuilt and redesigned as an environmental art event.
2	Launching an artist house	Sabotage of people saying that this place is not allowed to live	Transformation of the artist house into a permanent museum and gallery of works by Ahmad Nadalian and a shop of women art works of Hormoz and Qeshm islands
3	Holding environmental art events	Provide food and accommodation for participants	Propose to create a business to meet the needs of participants to the museum neighbors
4	Photographing indigenous culture in creative ways	No local women in front of the camera	Reconcile with the camera and strengthen women's self-confidence to participate in society
5	Collaboration in the sale of island women's soil paintings with two native women painters	Protests and clashes between several men of the island	Selling women's broken works with another story at several times the original price
6	Informing the activities carried out in Hormoz Island through personal website, social media and email to news agencies in two languages	Familiarity of tourists with the island and travel to it, despite the lack of information and tourism facilities on the island of Hormuz	The presence of women as salespeople in society
7	Teaching painting to women with colored island soil	Environmental concerns in soil use	Designing a tourism map of Hormoz Island, introducing ecotourism and dining hall to tourists, registering the location of the museum in Google Map
8	Collect and display traditional women's pants	Ethnic and religious prejudices	Use rock soil powder instead of colored soils
9	Establishment of a creative library for children	Corona Viruse restrictions reduced the flow of tourism on the island, resulting in reduced tourist activities at the museum.	Buy pants from the island's indigenous women and break the taboo

Table 2 - Show's some of the challenges of Dr. Nadalian Museum in promoting sustainable development.

Conclusion

As it mentioned earlier, generally development is associated with economic growth, but gradually it is intertwined with concepts such as cultural and social development. Today when we talk about development, we are talking about sustainable development. However, what is more important in this discussion is the connection between the activities of an international artist in a place called a museum and the local community. In general, the development of the Dr. Nadalian Museum in Hormuz Island has been community-oriented. Dr. Nadalian has faced the challenges in the Hormuz Island in a creative way and most of these challenges have been turned into opportunities through creative solutions. Generally, employment, presence, and activity in society, photography, and use of media are three important topics in the activities of Dr. Nadalian Museum that have been implemented in different ways in Hormuz Island.

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4- The role of museums in formation of society's belief in the importance of the environment

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Today, environmental crises threaten life on Earth. For the survival of mankind and the protection of the environment and to face the challenges, public belief in the significance of preserving the environment for the world future is important. Various tools can be used to create public respect to the environment. According to ICOM, "A museum is a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment".

Thus, museums, by preserving the cultural heritage of nations, play a key role in cultural exchange, the development of mutual understanding, cooperation and thinking together among the people. The purpose of this paper is examination the role of museums in shaping public belief in the importance of the environment and seeks to answer this question; how can museums contribute to the belief of community on the importance of the environment? In this article, we use the descriptive-analytical method.

At present, museums, in addition to their traditional role, can cultivate purposeful thinking in individuals by utilizing new methods of interaction, which increases the public's belief. Accordingly, by considering three important elements including easy communication, purposeful communication and up-to-date communication leads to raise interaction between people and environment and promote of it's in important among nations. It can be seems that museums have a unique role in recognizing the importance of the environment to society. In general, museums as a scientific center can make the insights and ideas of environmental protection into public belief in attractive ways through education, exhibitions, scientific visits, holding scientific meetings related to the environment and other programs.

Keywords: Museum, Public Understanding, Environmental, Interactive Method.

Introduction

Earth, water, air and human beings are interconnected members of life that must interact and balance with each other in order for the life cycle to proceed in a natural and logical process. Disrupting this balance and interaction has even disrupted the philosophy of human life and caused to environment crisis.

There is a crisis in the environment. Today's environmental crises are the result of man's irrational interference in nature and the misuse of natural resources. "The relationship between man and nature has never been more worrying and threatening than it has been since the beginning of creation (Baba Oghli, 2013). Accelerated development of technological developments and changing methods and patterns related to human life on the one hand and delay in planning related to the reduction of negative economic, cultural and moral effects on the other hand caused a series of environmental abnormalities and followed by serious concerns among life lovers and social reformers".

The environment is the place of living and the provider of the main human needs and its phenomena, which are increasing in importance every day, but unfortunately, human beings with improper use of without planning use from natural resources, use of dangerous, creating dangerous pollution in soil, climate and destroying the ability to live. It has been. (Echo article of Tabatabai Museum, 1373). Optimal use of the environment is a guarantor of preserving the quality of human life (Dolatabadi, 2003). Today, protecting the environment and ensuring its sustainability and comprehensive development is the most serious challenge facing the international community; therefore; Revival and maintenance of any life is equal to the possibility of a better and more life for humans on the planet (Valai, 2005).

In the present age, environmental crises threaten the life of the planet. For the survival of mankind and the protection of the environment and to meet the challenges ahead, public belief in the importance of preserving the environment for the future of the world is important. Various tools, including museums, can be used to create public belief about the environment. According to ICOM, "a museum is a non-profit, permanent institution that serves society and its development, is open to the public, and preserves the tangible and intangible human heritage and its environment for the purposes of education, study, entertainment and transmits and displays." (ICOM, 2007). The museum can also have a specific function and aims to provide reassurance through sensory experience, reconstruction and transmission of a culture (Deloche, 2007). Thus, museums, by preserving the cultural heritage of nations, play an important role in cultural exchange, the development of mutual understanding, cooperation and sympathy among the people. The purpose of this article is to examine the role of museums in shaping public belief in the importance of the environment and seeks to answer this question; how do museums increase community belief in the importance of the environment? Museums are an important tool for cultural exchange, enrichment of cultures, development of mutual understanding, cooperation and peace among people. In fact, the purpose of museums is to research the relics and evidence left by man and his environment, to collect the works, to preserve and maintain spiritual productivity, and to establish a connection between these works, especially to display them in order to study and benefit spiritually. Museums play an important role in teaching the

importance of the environment to children, adolescents and the general public. The interactive relationship of visitors with the subject and effect in the museum makes the process and result of education lasting and effective. Museums can provide arenas for dialogue around climate change. They provide opportunities for people to come together and explore alternatives beyond their daily lives and experience, and to gain perspectives on other people, communities, places and sectors.

- Museums can help people understand and explore the importance and impacts of climate change in a very wide range of heritage forms and sites– cultural, natural, in situ, ex situ(McGhie,2018).

In this article, we have used the documentary method to collect information and the descriptive research method to achieve the goal.

Results and discussion

One of the most important crises in the world today is the issue of environmental crisis. Much has been said about how and the dangers that this threatens human beings today, and various solutions have been offered from different perspectives. Notable factors related to environmental crises include air pollution, water, global warming, and so on. Different analyzes have been made about the cause of such dangers. In the meantime, one of the most remarkable and significant explanations is related to the new man's attitude towards nature and the ecology of his ecosystem. So that the emergence of a new attitude from a new perspective on nature, has caused man to deal with nature in a special way, the result of which is the situation we face today in the twenty-first century; That is, a situation that raises the question of how long the earth can be a safe place for us to live. Based on this, it can be said that environmental crises threaten human life in some ways. Therefore, human beings must use all available capacities and facilities for their survival. Museums are one of the most important institutions that can play an important role in creating a discourse on climate change. Museums provide opportunities for people to learn beyond their daily lives and experiences. Museums can help people understand and discover the importance and impact of climate change on a wide variety of cultural, natural, and heritage places. Museums are very diverse and cover a wide range of social and environmental issues. But they need support to build knowledge, trust and networking. Museums have a key role in addressing a number of key policies and strategies, including Article 12 of the Paris Agreement (Action for Climate Empowerment), and a number of Sustainable Development Goal targets2030, notably 4 to7 (McGhie, 2018).

Based on the discussions of the "International Symposium on Climate Change and Museums" held at the University of Manchester (UK) in April 2018. Participants established an informal alliance with museums, researchers, and agency-related representatives, including the UNFCCC and IPCC. Museums have come a long



way since the signing of the Paris Agreement and the United Nations Sustainable Development Goals, but they still have a long way to go. Some networks enhance museums' involvement in training and climate change activities, for example; The Coalition of Museum's for Climate Justice, the American Volunteer Association, the Network of Museum's, and Climate Change are working to support the contribution of museums in the sustainable future. Museums are officially recognized by the UNFCCC as key players in training and empowerment. Weather known (<https://unfccc.int/sites/default/files/resource/I03a2.pdf>) International networks of science museums have recognized that they have a broader role to play in promoting climate change programs, including the development of the Tokyo Protocol, which was formally implemented at the World Summit of the Science Center in Tokyo. Museums and museum networks have participated in two UNFCCC events and the 2018 World Summit of Action. The key role of museums was recognized by the UNFCCC in 2018, and Article 12 included action on climate empowerment. At least three networks have been set up for museums working on climate change in Canada and the United States. Various Conferences, workshops have been held to support museums related to climate change, such as the Anthropocene (Pittsburgh) workshop, Communication and Climate Change in Manchester Museums, the World Summit of the Science Center in Tokyo, etc. There is also a peer learning circle among museum trainers. Special museums on climate change have been established in Hong Kong, Germany, Norway, China, the United States, and so on. Other museums around the world are dedicated to sustainability, and many museums around the world support understanding the impact and importance of climate change (<https://mccnetwork.org/exhibitions/> use). The initiative, "Museum Partnership for the Future of Earth," is registered on the United Nations Development Programmer's online platform. This platform is available to promote the work of museums and related networks. These activities demonstrate the impact of joint museum's efforts to help people with sustainable development programs.

Environmental crises are spreading at full speed and intensity, and as the greatest challenge of the century, threaten the lives of billions of people everywhere on the planet. Dealing with environmental crises at various levels requires a fundamental move to turn public attention about environmental importance into a belief in the public mind. The condition for the continuation of this movement of reviewing the past is to study the current situation and plan for the future, museums have a pivotal role in this movement. Paying attention to public and comprehensive education by governmental and non-governmental institutions is important in order to provide a way to solve environmental crises, paying attention to environmental warnings about environmental crises and accepting social responsibility to reduce this issue. But the gap between science and society limits existing capacities, especially in the public and industrial sectors, to provide innovative solutions to solving climate change problems. In



order to create a constructive relationship between science and society, it can be used by scientific and cultural institutions such as museums, this institutions acts as catalysts and agents of change in climate change to reduce this institutions acts as catalysts and agents of change in climate change gap. Museums can act as intermediaries in unique public and transnational spaces in which different stakeholders, including government and society, play a role.

Accordingly, providing environmental education to all people, and the accountability of all organs is one of the appropriate solutions. Perhaps today crisis, which has affected the whole world, is the result of neglect of environmental health. Although, this hypothesis may be proven or disproved, but is the matter. We all should accept our responsibility an environmental protection. Our earth is disappearing and our environment is being destroyed. Undoubtedly, we are facing the serious consequences of the environmental crises that have arisen by ourselves. The world is affected by the irresponsible activities of societies. Over the years, many solutions have been proposed to solve environmental problems; but the key solution is human. People need to be environmentally aware of what they are doing and take positive action in this regard. Our lives are in our hands. Environmental crises such as global warming and over-consumption of fossil fuels appear to be due to our lack of proper knowledge of the nature of the environment. However; The solution is not simply to raise environmental awareness; Rather, it is necessary for human beings to make a clear and objective analysis of the environmental complexities in which they live in relation to their environment (Taheri, Taghizad, 1399). Museums are key places for education, interaction, action and research. Given the multiplicity and diversity of museums around the world, it can be said that museums have the necessary infrastructure for education, research and climate change management. By networking, museums can increasingly collaborate with each other and with others to accelerate education and climate action.

Conclusion

Today, the world needs museums to use cultural structures to offer new ways of identifying and challenging the myths and misconceptions that threaten life on Earth and human life. Public dialogue and participation in envisioning and creating positive futures, and effective multilateral partnerships are also essential. Museums are also fundamental research resources for understanding and preserving cultural and biological diversity in a rapidly changing world. Our vision for the near future is for museums to participate as constructively and effectively as possible in meeting the many challenges posed by climate change past, present and future. We have a responsibility, to support other museums and departments to achieve this vision. In the near future, museums will not only provide expert opinions but also facilitators and catalysts. Museums are part of a flexible network of institutions and organizations that support people's continuous understanding about rapidly changing world. Museums try to

introduce the importance of the environment to the public, both individually and through networking. Therefore, creating a transformation and promotion of environmental culture requires increasing the productivity of human resources in the field of environmental issues and the dissemination of environmental education in a wider dimension (Forsat, 2005). A number of museums, in their activities, pay attention to the issue of climate change and through various means such as research, holding various events such as festivals, exhibitions, purposeful and interactive visits and other cases to the capacities and potentials of museums in this field. They offer to the general public. Man must reconsider his relationship with the environment in order to survive and improve his standard of living. The first step in this review is to raise awareness and understand the importance of the issue. The need to protect the environment, rethinking development patterns and dealing with the surrounding environment are the most important ways to contain problems prevent environmental crises. Nowadays, museums, in addition to their traditional role can cultivate purposeful thinking in people by using new interactive methods, which increases the public's belief. Accordingly, by considering three important and special components in museums for easy, purposeful and up-to-date communication with the public, it can be said that museum's have a unique role in recognizing the importance of the environment to society as a whole.

Suggested solutions for creating public belief by museums

- Increasing the number of environmental museums or allocate part of science and technology museums to the environment;
- Joining to and strengthen cross-sectoral alliances at the local and global levels to achieve common goals with the UNFCCC, IPCC and other related matters;
- Supporting related international events such as World Environment Day, World Climate Dialogue Day, etc .; Holding lectures by prominent and famous people in the field of environment in museums;
- Holding scientific and artistic festivals on the subject of environment,
- Holding temporary exhibitions on the subject of the environment in museums and other busy urban centers; Performing environmental plays for the general public;
- Holding workshops and training courses for families and children on the subject of environment;
- Holding scientific visits to nature for the public
- Holding art competitions for the general public in the field of environmental issues;
- Holding exhibitions of books, scientific and cultural products in the field of environmental protection;
- Publishing brochures on environmental protection in simple language for the public



- Publishing books on environmental protection in simple language for the public
- Designing environmental games in cyberspace for children and teenagers
- Introducing scientists and environmental activists to making model
- Introducing positive environmental capacities to the community
- Award designing to environmentalists and activists
- Encourage people to reduce environmental pollutants in their personal and social lives in various ways; Conducting applied research on creating a community belief in environmental protection;
- Attention to humanities, especially social sciences in research related to the field of environment
- Preparation short and simple clips and animations to introduce the importance of the environment
- Providing public education to the general public on the importance of the environment.

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5- Science Museums and their approaches towards environmental concerns and climate change

Kimia Amini, Farahnaz Yeganeh

One of the most serious challenges facing the world today is climate change. 2021 has witnessed the profound impacts of the warming of the planet and climate events across the globe. Extreme weather, wildfires, floods, intense storms demonstrate that climate change is happening right now caused by human behaviours. Unlike what we tend to think, it is not a distant phenomenon. Increases in global temperature, sea-level rise, natural resource depletion, desertification, drought, freshwater scarcity and loss of biodiversity (name a few) are threatening both the future of humanity and the whole planet on which we live.

Climate change is a complex and intertwined issue. It has cultural, political, technological, economic and scientific dimensions which are contingent on each other. Therefore, different sectors and organisations in a society have a role to play in tackling climate change. The cultural sector and cultural institutions including museums and science centres are not exempt. In fact, they have the potential and the capacity to not only inform and raise public awareness about the environmental issues and climate crisis but also to empower them by inspiring to think and formulate their own values/positions and encouraging them to take positive action for their future sustainable society.

This paper explores how climate actions are being practised in three science museums. It is necessary to mention that our scale is not comprehensive. We attempt to select museums trying to do things differently and have taken new approaches to their core activities. The Science Museum London, the National Museum of Emerging Science and Innovation (Miraikan) Japan, and the Climate Museum New York are the case studies. The different approaches, strategies, and methods these museums have taken and how they have incorporated climate change in their practices and programmes are explored. The paper concludes how powerful platforms these museums can be to fight against the climate crisis and how vital the work of these museums is.

Keywords: climate change, environmental concerns, science museums, various approaches, climate action, sustainable world



Introduction

Climate change is one of the most serious challenges facing the world today. 2021 has witnessed some of the severe impacts of the warming of the planet and extremes climate events across the globe. People in all parts of the world are starting to see the impacts of climate change around them. Deadly flooding happened in Germany, Belgium, China and India drove by extreme rainfall; record-breaking heatwaves in the Pacific Northwest of the United States and Canada fuelled devastating wildfires, and the Arctic lost an area of sea ice equivalent to the size of Florida¹. According to the newest report from the UN's Intergovernmental Panel on Climate Change, this is just a taste of what's to come. It also states that the scale of recent changes across the climate system (such as the increase in global surface temperature and greenhouse gas concentrations, the dramatic decline of Arctic Sea ice, hot/cold extremes, heatwaves, droughts, fire risk, heavy precipitation, flooding, intense storms, ice-sheet collapse, sea-level rise, glacial retreat, acidic ocean, massive forest loss, just to name a few) has been unprecedented for centuries to millennia (IPCC, 2021). These changes demonstrate that climate change is already happening caused by human behaviours and activities affecting all the major climate system components in every region on Earth, with some responding in coming decades and others by centuries.

The effects of climate change also include refugee crises, public health emergencies, military conflict, eco-cities for the super-rich, and reckless experiments in geo-engineering. The social and natural impacts of climate change are not distributed evenly. They are felt most severely by communities influenced by histories of racism, colonialism, and poverty, who are the least responsible for producing greenhouse gases (Lyons & Bosworth 2019). Therefore, it is urgent more than ever to take immediate action on climate change to avoid its worst effects; the future of the planet largely depends on the choices and actions taken by humanity today.

1.1 The role of museums in tackling the climate crisis

Climate change is a complex and intertwined phenomenon. It is not just a scientific concern but involves many aspects that encompass economics, politics, sociology, culture, geopolitics, law, health, to mention just a few. It is a phenomenon shaped by multiple different actors and institutions (Cameron 2011, McGhie 2019, Maslin 2019). Therefore, different sectors and organisations in a society have a role and responsibility to play in tackling climate change. Solutions on what to do must involve dialogues and decision making with many agencies, stakeholder groups and communities crossing all sectors and scales (Cameron et al., 2014). The cultural sector and cultural institutions including museums, are not exempt/ are no exception. In fact, they can become essential agents in tackling the climate crisis as they occupy a privileged position in society.



Museums are places that disseminate trusted sources of information, provide a platform for conversations, debates, sharing of different knowledge, experiences and opinions, and promote research and informal education (McDowall 2019; Cameron 2012).

They are no longer only focused on the traditional values of custodianship, collection, preservation and interpretation but also on their social role and the responsibility they have to be at the service of society and meet the needs of their communities (Brown and Mairesse 2019).

By addressing climate issues, museums show that they are socially relevant, responsible and purposeful in a contemporary world. So, they are not viewed as places for educating people about the past but helpful in the present (McDowall 6, 2019). Museums can be agents of change if they reposition themselves in relation to real-world issues and redefine their roles according to society through articulating new goals that respond to local and global social concerns and challenges such as climate change (Sandal 415 :1998; McGhie 24 :2019).

Through programmes, research and advocacy, they can offer an exciting and innovative way of raising awareness and communicating information concerning environmental issues and climate change to the public with the capacity to influence their attitudes towards the natural environment and foster environmental values. Therefore, museums and science centres are uniquely placed to not only raise awareness and inform the public about climate change and its wider impacts on every aspect of life but also to inspire and encourage them to engage with climate change issues and environmental activities (McDowall 2019; Cameron 2012).

What can be seen in recent years are museums of many kinds emerging as key players to promote greater public awareness, better understanding, education and action on climate change and environmental issues (Cameron et al 2013; Cameron et al 2014; McGhie 2019). They are beginning to recognise that they have a crucial role to play in shaping and supporting society's response to this crisis (Sterling and Harrison, 2020). This paper investigates science museums among other various museum types engaging with climate change and environmental sustainability.

1.2 Science museums/centres

Science museums/centres once traditionally tended to focus on collecting, preserving and showcasing the static displays of objects, and later communicating science through hands-on and participatory experiences, they are slowly reframing their identities, purposes, and functions to changes in contemporary societies (Pedretti & Navas Iannini, 2020).

By emerging modern trends in museology and moving away from the more traditional object-based approaches, modern science museums brand themselves as 'science centres' or 'discovery centres' covering a wide range



of subject matters and featuring many interactive and hands-on displays and exhibits that encourage visitors to experiment and explore (Kaushik, 1997). They aim to provide an opportunity for individual taste, ingenuity and innovation through two-way communication approaches, in contrast to the traditional scheme of science museum experience that held the individual tightly within a given order, subordinate to its structure and patterns (Kaushik, 1996).

Science museums are slowly reshaping their identities and social goals to explicitly include and promote active citizenship, social responsibility, technology, society, environmental issues, and agency. They are beginning to reimagine their space and practices to embrace broader goals and consider themselves as key players in several external scientific, social, cultural, and political contexts (Koster 1999; Pedretti & Navas Iannini, 2020).

What follows is an analysis of different approaches taken by science museums in tackling climate change and their practices in response to growing environmental and sustainability concerns.

Case studies

The following case studies are examples of how science museums are practising climate action and how they are incorporating climate change into their practices/programmes/activities. It was tried to choose the case studies which were distinct in their approaches, strategies, and methods in engaging with climate change. Our case studies are also in chronological order starting from the older to the recent time showing evolving the science museums with the times, from traditional styles and functions to science centres and beyond.

Science Museum London

Having its origin in the Great Exhibition of 1851, the Science Museum was founded in the early 20th century (1909). The Museum evolved with the times from being the collection of objects to pioneering interactive science for more than eight decades (Rising to the challenge, 7 :2020). Its global collection explores science, technology, engineering, mathematics and medicine that shape the world. Later, other museums incorporated and constituted the Science Museum Group (SMG).

The Museum approach

Vision statement

The Museum vision is to have a society that celebrates science, technology and engineering and their impact on our lives, now and in the future (Inspiring Futures, 9 :2020).

Mission Statement

Science Museum London states its mission to inspire futures. It does so by:

- Creative exploration, technical innovation and industry, and how they made and sustain modern society
- Building a scientifically literate society, using the history, present and future of science, technology, medicine, transport and media to grow science capital.
- Inspiring the next generations of scientists, inventors and engineers (Inspiring

Futures, 9 :2020).

Despite its old history, the Museum claims that it has been a dynamic organisation, responding to change and opportunities. This means that Science Museum illuminates not only the history of science, technology and engineering through its collection but also provides contemporary context and look to the future. It exhibits how science, technology and engineering have changed the world as well as how they are addressing today's and tomorrow's big societal challenges and opportunities including sustainability and adaptation to climate change. Thus, the Museum brings and connects the past, the present and the future as a focus for concern (Inspiring Futures, 11 & 8 :2020).

The Museum also reflects science as a facet of broader culture. Since 1960, its displays shifted from focusing on technical education informed by historical interpretation to modern interpretation informed by placing objects in the social context (The Science Museum, 2017, p. 7). Thus, the Museum does not separate science from its social and cultural dimensions (Cameron et al 2014).

The Science Museum Group published its Sustainability Strategy and Policy¹ in 2020, the year in which the Science Museum hosted the launch of both the UK Year of Climate Action and the UN's 26th Climate Change Conference- COP26, to advance its sustainability priorities as an organisation (Rising to the challenge, 2020:1). It asserts that this policy is not only about public engagement on the science of climate change but is also about changing the Group's approach and working practices towards sustainability.

The Science Museum Group aims to lead public engagement in the UK on the science of climate change and help inform the debate around human-induced climate change and sustainability issues through their actions and programming. However, it claims that sustainability is not a project or a programme but has become its culture and part of everything they do (Inspiring Futures, 12 :2020). In this regard, the Group has introduced a carbon literacy training programme to support its colleagues, from explanations of the science behind climate change to action training for managers to identify practical ways to cut emissions (Rising to the challenge, 21 :2020).

The Museum practices

There are two main pillars for the Science Museum Group's sustainability actions: the public offer and the operations.

● The public programme

The Science Museum claims that climate change has been part of their programme for more than a decade, starting with the Science Museum's Atmosphere Gallery exploring the science of climate change and solutions to challenges posed by a warming world in 2010² and it will be the central theme in the next decade for the transformation of the Group³.

1- <https://www.sciencemuseumgroup.org.uk/about-us/policies-and-reports/sustainability-policy/>

2-<https://www.sciencemuseumgroup.org.uk/blog/-/2020uk-year-of-climate-action/>

3-<https://www.sciencemuseum.org.uk/about-us/press-office/science-museum-group-announces-major-focus-sustainability-2021-public>



However, we should not forget that the gallery at the time of opening was sponsored by Shell (an Anglo-Dutch multinational oil and gas company) seeking to directly influence the content of the Atmosphere's gallery in order to avoid any negative framing of Shell's operations and damage its reputation (McDowall, 15 :2019). This raised questions about the influence of fossil fuel companies (which are tied with pollution, corruption and climate science disinformation) over cultural institutions in the construction of public knowledge and narratives about climate change and how these companies use museums to legitimise their actions and activities¹. The controversy is over the implications of partnerships with the fossil fuel industry for museums and how they undermine their missions and abilities to produce meaningful responses to climate change (McDowall, 29 :2019).

Nevertheless, the Science Museum Group announced a major focus on sustainability and climate change in its public programme (events, exhibitions, and films) throughout 2021 to reinforce its commitment to raise climate awareness and engage its physical and digital audiences with the science of climate change and solutions to tackle it².

These climate related programmes focus on how science and engineering has led in the past and is driving current technological and nature-based solutions to tackle challenges around energy and food transitions and greenhouse gas removals³. They are as follow:

- An eleven-part climate event series and webinars, "Climate Talks", launched in January 2021 and run until the start of COP26 in Glasgow in November 2021. This series streamed online to connect with a global audience and bring together an international line of experts, campaigners and cultural figures exploring the problems caused by climate change and discussing how to tackle the most pressing issues around it⁴.

- Coinciding with COP26, the Science Museum's exhibition Our Future Planet opened on 31 March 2021 and remains open to the public during COP26, the UK's first major exhibition about carbon capture and storage including objects on display in the UK for the first time. Objects on display highlight the importance of this research to help protect the planet from the effects of global warming caused by excess carbon dioxide in the atmosphere- the most significant cause of climate change.

This free exhibition explores the latest techniques and technologies being developed to trap, use, and remove carbon dioxide released by human activity, notably the burning of fossil fuels from the atmosphere⁵. Again, Shell sponsorship of this climate change exhibition has been controversial. A group of climate protestors, 'Scientists for Extinction Rebellion' and 'UK Student Climate Network' was campaigning against the Science Museum Group's ongoing relationship with the fossil fuel giant Shell⁶. The protestors said that the Science Museum's continued partnership with fossil fuel producers gives legitimacy to their

1- <https://www.theguardian.com/business/2015/may/31/shell-sought-influence-direction-science-museum-climate-programme>

2- <https://www.sciencemuseum.org.uk/about-us/press-office/science-museum-group-announces-major-focus-sustainability-2021-public>

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4- <https://www.sciencemuseum.org.uk/about-us/press-office/science-museum-group-announces-major-focus-sustainability-2021-public> & <https://www.sciencemuseumgroup.org.uk/our-work/sustainability-approach/our-public-programme/>

5- <https://www.sciencemuseum.org.uk/about-us/press-office/science-museum-group-announces-major-focus-sustainability-2021-public> & <https://www.sciencemuseum.org.uk/see-and-do/our-future-planet>

6- <https://www.museumassociation.org/museums-journal/news/06/2021/science-museum-climate-protestors-criticise-heavy-handed-response/>



planetary destruction and fossil fuel extraction¹ and is essentially greenwashing the discourse surrounding climate change and needs to stop². Thereby, the Science Museum contradicts its own commitments to addressing the most urgent scientific challenge of our time.

- New online stories in the Objects and Stories section explore the environment and sustainability through the lens of the Science Museum Group Collection. These illustrated articles weave together historic objects, transformative events and people stories³. These stories explore what we know about climate change, how we know it, and what we can do to mitigate the impacts of the current climate crisis⁴.

- A range of climate related resources and activities such as videos, hands-on activities, and 3d objects on the website explores the relationship between the natural environment and humans aiming to engage families and students (age 16-5) in the conversation on tackling climate change⁵. Students can do these, whether at home or in the classroom. In the section of 'videos and discussion starters', students (age 16-11) are encouraged to watch the video events, think and discuss the natural world and our impact on it.

● The operations

The Group has set a net zero emissions target to achieve by 2033 through:

- Reducing energy use and greenhouse gas emissions from its operations, procurement and supply chain including a %25 decrease in energy use and a %69 drop in carbon emissions since 12/2011, despite increasing floor area by %24 as a result of museums joining the group (Inspiring Future, 2020:14).

- Emphasising on greater sustainability in the procurement such as purchasing all electricity from renewable sources;

- Enhancing the biodiversity and remove carbon dioxide from the atmosphere at each of the Group's museums such as planting 1,000 native trees every year until 2030, in addition to the 43,000 native trees already planted over the past decade (Inspiring Future, 2020:14).

- Reducing waste and more recycling; making exhibitions more sustainable and minimising waste and the environmental impact by choosing sustainable and recyclable building materials and reusing components whenever possible⁶.

The National Museum of Emerging Science and Innovation (Miraikan)

The National Museum of Emerging Science and Innovation (Miraikan) was established in Tokyo in 2001 by the Japan Science and Technology Agency. The Museum nickname 'Miraikan' originates from 2 Japanese words: 'Mirai' meaning future, and 'Kan' meaning museum. So Miraikan literally means 'Museum for the future' (Uchida, 2015).

The Museum approach

Vision statement

Miraikan describes itself as a new type of science museum as it is free from the limitations of a traditional definition of a museum¹. It does not have a permanent

1- <https://morningstaronline.co.uk/article/b/xr-scientists-lock-themselves-to-a-mechanical-tree-against-a-science-museum-exhibition-sponsored-by-shell>

2- <https://www.museumnext.com/article/young-climate-campaigners-vow-to-keep-protesting-over-science-museums-fossil-fuel-sponsorship/>

3- <https://www.sciencemuseum.org.uk/about-us/press-office/science-museum-group-announces-major-focus-sustainability-2021-public>

4- <https://www.sciencemuseum.org.uk/objects-and-stories/our-environment>

5- <https://learning.sciencemuseumgroup.org.uk/learning-resources/climate-resources-and-activities/>

6- <https://www.sciencemuseumgroup.org.uk/blog/how-can-we-make-exhibitions-more-sustainable/> & <https://www.sciencemuseumgroup.org.uk/our-work/sustainability-approach/towards-net-zero/>



collection because it focuses on cutting-edge science and technology. They believe the science and technology topics are based upon ongoing research that has no artifacts. So, the exhibitions are developed every year and are linked to the most up-to-date science and technology as they change and advance very quickly (Uchida, 2015). The Museum approach regards to the content and developing exhibitions, events, and other activities are like an experiment as it claims:

"Miraikan is a place of challenge where all exhibits, events, and other activities and content is an experiment, and a place to consider and discuss our unknown future. Miraikan has transformed exhibits to enable visitors to interactively experience science and inspire visitors to think for themselves. We continue to develop exhibits every day through repeated experimentation."¹ In its Vision 2030, it states that "Miraikan will exceed the museum concept in the next 10 years".²

Mission statement

First, Miraikan mission is "to help people understand the things happening in our world today from a scientific point of view and engage in dialogues with real scientists while considering the future that awaits us".³ It shows that the Museum does not focus on the past but also on today and how today's issues relate to the future and future generation.

The Museum also mentions that its approach in content creation has changed over its 20-year history from conveying science and technology to inspire people to think and take action for their future. Thus, it goes beyond simply providing knowledge to be a platform that transcends that knowledge and involves the visitors to conceive and "create a better future together".⁴ This suggests that the Museum believes in both individual and collective action and the power of collective creativity as saying that "Each voice, each action changes the world and builds our future".⁵ So, it promotes active citizenship and social responsibility in building a better future and inspires people to believe that they can change their future.

Second, it contemplates the future from a perspective that treats science and technology as culture

<https://www.miraikan.jst.go.jp/en/aboutus/20th-movie/theme01/>

It shows that the Museum is not concerned with only presenting decontextualized and abstract scientific concepts and phenomena, but it believes that science and technology are not isolated from everyday life. Thus, it is seeking to make greater connections to be made between nature and society and acknowledges the relationships between them (Cameron 2011).

7- <https://www.miraikan.jst.go.jp/en/aboutus/20th-movie/theme01/>

1- <https://www.miraikan.jst.go.jp/en/aboutus/20th-movie/theme03/>

2-<https://www.miraikan.jst.go.jp/en/aboutus/vision/>

3- <https://www.miraikan.jst.go.jp/en/aboutus/>

4- <https://www.miraikan.jst.go.jp/en/aboutus/directors/>

5- <https://www.miraikan.jst.go.jp/en/aboutus/vision/>



Third, Miraikan has continued to consider and questions its own role as a science museum and its future potential in a world in flux. Thus, Museum states that it is an open forum for all to envision a future sustainable society by reconsidering the role of science centres and museums.

<https://www.miraikan.jst.go.jp/en/aboutus/vision/>

It demonstrates that Museum has articulated broader goals and social roles that respond to local and global concerns. And last, the global environment is also mentioned as one of the diverse topics covered in many special exhibits that visitors can experience¹.

The Museum practices

It is notable that the Museum states that it contributes to the SDGs (Sustainable Development Goals)². SDGs (made up of 17 goals and 169 targets) adopted at the United Nations General Assembly in September 2015 are international goals addressing the world's greatest social and environmental challenges in order to set the world on a path to a sustainable future by 2030. Climate change relates more or less explicitly to all 17 SDGs (McGhie, 2019).

Miraikan hosted the "Science Center World Summit" in 2017, where science museums from around the world held discussions and established the "Tokyo Protocol" action guidelines, agreeing that science centres will take action in order to foster understanding among citizens and promote activities to contribute to achieving the SDGs³.

Based on this Protocol, Miraikan declares that it will contribute to the achievement of the SDGs and the creation of a sustainable society through developing and promoting different exhibitions, activities, and contents. Some of the main activities of the Museum relating to climate actions (and SDGs in general) that help to solve global issues are as follows:

- The "TSUNAGARI" Project

The word "tsunagari" in Japanese means links/connections/relationships. The Project began in 2011 through collaboration with researchers and artists within and outside Japan. It involves collecting scientific information about the Earth and communicating that information in a visual manner that appeals to the senses (Uchida, 2015).

The mission of the Project is to deepen people's knowledge about the Earth and themselves, help them connect to it, consider the ways to link and relate today's Earth to the future and future generations, and create a vision for the future with people around the world (Uchida, 2015).

The Project develops and promotes exhibits and contents that allow visitors to discover Earth from many perspectives, conveys a wide range of 'tsunagari' to the Earth, and promotes activities that help to solve global issues⁴. The Project

1- <https://www.miraikan.jst.go.jp/en/aboutus/>

2- <https://www.miraikan.jst.go.jp/en/aboutus/sdgs/>

3- ibid

4- <https://www.miraikan.jst.go.jp/en/resources/tsunagari/>



encourages citizen participation in global sustainability that is needed to achieve the SDGs.

Scientific information of the Earth is collected, displayed, or screened on the globe-like Geo-Cosmos, the Geo-Scope, the Geo-Palette, and the Geo-Prism that are parts of the Tsunagari permanent exhibitions. The contents visualised on these systems cover different environmental, Earth climate issues (such as Earth surface temperature, forest fire, ozone concentration, carbon dioxide concentration, global chemical weather forecast, air temperature, sea surface temperature, sea acidity, etc.), and predictions for the future of the global environment. These permanent exhibitions connect the exhibition system to the world and create a new perspective of the Earth based on the concept of 'tsunagari' (links/connections/relationships)¹.

They allow visitors to rediscover new aspects and connections about the global environment and human activity from a variety of perspectives and learn about the Earth's most current situation from data, collected by scientists and research institutes throughout the world, giving a sense of the countless connections between humans, animal behaviour, and environmental changes on the planet².

- SDGs workshop "Steer Towards the Future!"

Miraikan organised an SDGs workshop aiming at school students (18-10 years old) to learn how to achieve a sustainable, global society with other countries. Players will be divided into 5 groups (virtual countries), and try to protect their own country, as leaders, from hazardous events related to Climate Change. Players will experience the importance of "Partnerships", which is essential to achieve the SDGs³.

The Climate Museum

The Climate Museum is the first museum in the United States dedicated to the climate crisis⁴.

It was founded in 2016 by Miranda Massie, a civil rights lawyer in New York, who was increasingly concerned about social injustices caused by environmental damage (Newell, 608 :2020).

The Museum approach

Mission statement

The Museum mission is "to inspire action on the climate crisis with programming across the arts and sciences that deepens understanding, builds connections, and advances just solutions"⁵.

As its director says, since its beginning, the institution has transformed from an organization using art to raise awareness about climate change to an institution focused on the intersection of art, climate science, justice and activism. Thus, the Museum's approach is to create a wider culture of climate-forward thinking and active engagement" (Massie 2020).

1- <https://www.miraikan.jst.go.jp/en/resources/tsunagari/>

2- <https://www.miraikan.jst.go.jp/en/exhibitions/tsunagari/>

3- <https://www.miraikan.jst.go.jp/en/resources/provision/sdgs/>

4- <https://climatemuseum.org>

5- <https://climatemuseum.org/mission>



The Climate Museum describes its purpose is to harness the power instilled in it as an institution to spark learning, dialogue, action and a cultural shift. Through its diverse programming, the Museum seeks to connect diverse audiences, offers many entryways into the climate conversation, and pushes many people toward action as possible (Massie and Reyes, 296 :2020). The most important thing is that the Museum aims to make people feel that collective action is both possible and necessary¹.

The Climate Museum exhibitions and public programmes transcend traditional disciplinary boundaries. The Museum still doesn't have a physical location, but it has established effective partnerships with organisations and institutions to support and host temporary installations and programming around the city. The programmes are presented, whether at its temporary exhibition space and in places people are comfortable accessing them – in parks, galleries, fairs, in venues citywide, road verges and through virtual events—and in multiple languages (Newell, 610-609 :2020).

The Climate Museum has three key features in its approach:

- Empowerment: The Museum through its programmes, gives people the tools and confidence to become more climate active.
- The power of art and stories: The Museum utilizes art and storytelling for witnessing impacts, sharing insights, creating meaning and identifying hopeful ways forward amid fear.
- Imagining positive futures: The Museum creates opportunities for fruitful imagining and shares visions of the positive future while communicating the gravity of the crisis (ibid: 612-610).

The Museum practices:

The Climate Museum's goal is to incorporate both a call to action and specific steps to guide attendees and participants toward action into all of its programs, which have included exhibitions, panel discussions, public arts campaigns, educational initiatives, youth and adult workshops, and more. The Museum is looking for creative ways of engaging with climate action, and how imagination and vision inspire audiences. Through its public programmes and events, the Climate Museum aims to create novel pathways for people to face the climate crisis, open people up to conversation, break the climate silence, build dynamic communities, and promote collective action (Massie and Reyes, 287 :2020).

The highlighted actions all have a civic orientation, designed to inspire audiences to think of action as it relates to how they are placed within their communities and their larger political environments (Perera, 2021).

- Arts

The Museum provides its community with opportunities to use the arts to

1- <https://www.washingtonpost.com/climate-solutions/10/09/2021/museum-miranda-massie-art/>



examine the realities of climate change. As mentioned earlier, the Museum recognises the power of art to create the empathy needed to push people to act and spark personal commitments to pursue solutions (Newell, 610 :2020). The arts events include art installations staged in parks and public spaces across New York City, performance, mural painting, and citywide arts activity¹.

- Science education

The Museum aims to make people confident in the fundamentals of climate science and ready to act. Thus, it has held various events to help make climate science and solutions for the climate crisis accessible to audiences of all ages, including a citywide “Ask A Scientist Day” with climate science experts, lessons at NYC elementary schools, a teacher training in climate change education, a solar energy workshop².

- Youth leadership programs

The Climate Museum supports young people to become climate change ambassadors, including training to lead exhibition tours and boosting programs through social media or outreach in their communities (Newell, 610 :2020). The Climate Action Leadership Program (CALP) is the Museum youth-focused volunteer program for U.S based high school students passionate about fighting for a livable and just climate-safe future³.

- Community engagement

In partnership with local organizations, the Museum has co-presented walking tours, co-hosted a climate justice teach-in, and participated in climate marches. It aims to advance its mission through the young people and diverse communities it engages in deeply transformative ways (Newell, 612 :2020)⁴.

- Screenings, panels, and talks

The Museum builds climate conversation and public discussions through a variety of screenings, panels, and talks. It not only hosts events but also participates in panels and talks. Climate Museum staff have also lectured at various universities as well as at middle schools and high schools in NYC⁵.

- Exhibitions

The Climate Museum organises a range of different exhibitions across the art and science presented in galleries, parks and public spaces.

In summary, we have explored three science museums engaging with climate change and environmental issues, starting from the Science Museum London, an example of an established science museum that began with the collection of objects but evolved with the times. Miraikan, our second case study, describes itself as a new type of science museum which deliberately sets out to have no permanent collection. Then, we have our last case study, the Climate Museum, which has neither a physical location nor a collection. Our case studies are examples of the evolution of science museums from traditional styles and functions to modern science museums that do not confine themselves to the

1- <https://climatemuseum.org/programs>

2- <https://climatemuseum.org/programs>

3- <https://climatemuseum.org/climate-action-leadership-program>

4- <https://climatemuseum.org/programs>

5- <https://climatemuseum.org/programs>



cases of objects to initiatives that promotes critical thinking and activism without a physical location reflecting more contemporary and forward- looking goals that speak to present-day museums' changing landscapes. This demonstrates science museums have reinvented themselves and revised their missions, purposes and functions over time and moving through different generations (Pedretti & Navas Iannini, 2020).

Also, there are three appealing features in the approaches and practices of these science museums that we believe other science museums can utilise and apply.

First, these three case studies do not focus only on informing the visitors with the latest scientific data but on creating and designing richer experiences. Visitors can deepen their connection with the natural world through their personal experiences, points of view and interests. As McGhie (2018) states, museums should provide people with opportunities to express their ideas, values and concerns. They should not regard visitors as passive recipients of information but inspire them to think and allow them to explore climate change more creatively, shape their own understanding of the problem and possible solutions, and find their own level of challenge and meaning.

Second, these museums treat science as a facet of a broader culture. They are not concerned with only presenting decontextualized and abstract scientific concepts and phenomena, but they believe that science and technology are not isolated from everyday life. Unlike other science museums, they do not separate science from its social and cultural dimensions and acknowledge the complex relations and entanglements between nature, science, culture, social practices and worldviews (Cameron et al., 2014).

Third, these museums have a future-oriented and forward-thinking frame as they link the past to the future through projections of what might happen. As said by Cameron (2014), museums can engage the future by using creativity and imagination. This imagination should share visions of a positive future that is achievable. The emotions museums aim at should have joy, wonder and delight, rather than just pressing the buttons of fear and guilt.

And last but not least, museums that take sponsorship from the fossil fuel companies for their events and exhibitions (such as the Science Museum London) should take a stance and acknowledge this involvement, reflect on these relations, and address more openly the presence of this industry in their activities. They need to rethink their social and environmental responsibilities when the world is facing a climate crisis and these fossil fuel companies are at the centre of the present crisis.

Conclusion

Museums have inherent capabilities, resources, and opportunities that position them to influence public responses to climate change and be powerful and



influential advocates for grassroots activism (Sutton 2020). They just need to deploy them purposefully, direct them constructively and creatively towards climate action and support ongoing movements and campaigns in sustained and substantial ways (McGhie 2019; Lyons& Bosworth 2019).

The role of the museum sector is not only to inform the public about climate change but also to equip citizens with tactical knowledge that enable participation in actions and debates on climate change that affect their futures (Cameron et al 2013). Museums have this opportunity and responsibility to use their power to influence and to inspire, to produce the action that is so desperately required (McDowall, 2019). In addition, engagement in global challenges such as climate action can create an opportunity for museums to re-evaluate their social roles and responsibilities and realise their social potential. Thus, they can offer more effective service to society (which is their general mission) and contribute towards making a livable, sustainable and equitable world.

6- Green Museums: A New Approach for Preservation of Museum Collections in Iran: Challenges, Strategies and Requirements

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Abstract

Excessive consumption of energy resources, environmental interventions and climate changes have brought about some concerns for the global community. The emergence of sustainability and green movements is the byproduct of these preoccupations. Types of activities undertaken by museums to protect and preserve artefacts and their missions in terms of education and cultural transfer in societies require them to be much costlier than other centers and consume much more energy as well. Increase level of familiarity with the environmental effects led to changes in operation procedures of cultural heritage institutes including museums. Over past two decades and in light of introduction of the sustainability into the sphere of museums, a new concept namely the green museum emerged across the world. Allu ding to the concepts of sustainability and green museums, the present study aims at presenting some results of a project entitled "evaluating the air quality at museum environments: on the way to green museums" that began in Iran in 2016. Then, based on the results of the study, researchers have delved into details of challenges, strategies, and requirements of Iranian museums for performing green activities or continuing

the green journey.

Key words: green museums, sustainability, air quality, climate, museum collections

Introduction

Climate Change and Sustainability

After the Industrial Revolution, noticeable industrial and economic prosperity emerged. Together with the growth of population, such prosperity brought about an increase in the fossil fuel consumption which consequently led to higher degree of intervention in the nature and various types of pollution across the world such as the greenhouse effect (Maeda, 2011). Emergence of the greenhouse effect as a result of CO₂ emission together with the increasing average temperature of the earth and climatic changes have caused some repercussions including melting of glaciers, higher levels of water in seas and oceans, an increase in precipitation and rains in some areas and drought and wildfires in other regions and compulsory displacement. All of these changes have disturbed the natural order of the world.

Researches conducted on the excessive trend of consuming energy resources and its consequences have raised concerns and public awareness of the global community. These concerns led to introduction of a new concept namely sustainability. For this reason, the World Commission on Environment and Development was established in 1983 whose goal was "improving wellbeing in the short run without causing dangers for the regional and global environment in the long run". The Commission issues a report entitled the Brundtland Report in 1987 whereby the sustainable development was defined as the process of meeting the current needs of the man without destroying the ability of the future generations to meet their needs. In other words, all the activities and plan need to be in line with the support of environment conservation, health and wellbeing of the man as well as solving economic problems (Elkington, 1997).

Concerns over the climate change grew dramatically that led to conclusion of an international agreement in Paris in 2015 aiming at strengthening the global response to the threat of the climate change. It was agreed upon that the energy and fossil fuel consumption should be decreased in a way that the temperature rise need to be preserved at less than 2 degrees Celsius by the year 2030 (UNFCC Climate, Get the Big Picture, n.d.).

Green buildings

Since more than %40 of energy and resources are used for construction across the world and %30 of the greenhouse effect emanates from activities in this field, application of sustainable methods such as renewable energies, lower consumption of construction materials and green buildings have been introduced

into the literature since 1980 (Doan et al., 2017). With their sustainable design, green buildings protect energy and natural resources through efficient and smart ways of energy use. The natural daylight is used in these buildings and the indoor air quality (IAQ) is improved via efficient air conditioning and the use of non-toxic materials (Brohpy & Wylie, 2008).

Difference between “green” and “sustainability”

The term of “green” is essentially used for environmental-friendly methods such as green energy, lower consumption of water and energy, waste management, and using indigenous, non-toxic and renewable materials; however, the term of “sustainability” covers all the environmental, social and economic aspects. Therefore, “green” is an important part of the multidimensional concept of sustainability. According to Brophy and Wylie (2013), the concepts of green and sustainability are like two famous expressions in medicine as “don’t cause any harm” and “don’t cause any harm and keep the patient alive” respectively.

Green museums

Familiarity with environmental effects led to changes in the operational procedures of cultural heritage institutions such as museums. Experts of this field assert that due to special requirements of conservation and retaining artefacts and their daily activities, museums need to have a great deal of energy for lighting, air quality control, water storage, transportation of relics and the staff. Additionally, as per their missions in terms of offering cultural services and education, museums are in need of much more energy consumption compared to other similar buildings. Those specialists have also come to understanding that the global warming and climate changes require reviewing traditional methods used as well as taking some preventive conservation measures (Podany, 2002). Consequently, in line with the increasing activities of green buildings as well as introduction of the concept of sustainability to the field of museums, another new concept namely the “green museums” has come into being. As it has been alluded to by Brophy (2007), unlike green buildings and missions of museums, “being green for museums as smart buildings does not merely mean choosing sustainable products or having environmental awareness but rather it means futuristic commitment of managers and staff on museums and transferring this commitment to external and internal audiences as well as the lifestyle chosen”. In other words, museums not only contribute to the preservation of the past but they play an important role for being green at present and creating a sustainable environment for the future. Therefore, concepts of green and sustainability are used interchangeably in the domain of museums. Getting on the path of “green museums” was firstly highlighted by museums of children and sciences since they were greatly interested in topics such as the climate and environment conservation and consequently, green activities were integrated in their missions and strategic documents (Brophy, 2011). Gradually, other museums

took some feasible steps from simple to complex ones towards reducing energy consumption and conservation of resources using for their operations.

Rating of green museums

In 2013, another measure was taken by the American Alliance of Museums to set sustainable standards for museums at its conference in Baltimore where more than 100 experts from various museums across the United States attended. Participants at this gathering finally issued a report entitled "Museums, environmental sustainability and our future". It was decided to make use of standards of Leadership in Energy and Environmental Design (LEED) rather than developing a new instrument exclusive for rating of museums. LEED is one of the most practical and important rating systems that was developed by U.S. Green Building Council (USGBC) in 1998. According to LEED, museums are assessed based on 6 criteria as follows:

Location and transfer (LT)

Sustainable sites (SS)

Water efficiency (WE)

Energy and atmosphere (EA)

Materials and resources (MR)

Indoor environment quality (IEQ)

Mark Twain House and Museum in Hartford was the first museum to receive the LEED certificate. The highest score on the green museum of the world has been given to the California Academy of Sciences. As a natural history museum, the California Academy of Sciences hosts millions of fauna and flora species. This building was constructed on an old one that was destroyed after the earthquake of San Francisco. The new building was inaugurated in 2008. To construct this building, materials such as concrete, steel, glass and thermal insulators were used. A great portion of these items were of recyclable materials such construction wastes of old buildings and Jeans fibers. Some prominent features of this building include paying attention to the environment, leaving the minimum damage on the natural habitats, making use of sunlight, natural air conditioning, solar cells, green roofs, collecting rain water, and waste treatment through green roofs. According to the CEO of the California Academy of Sciences, Gregory Farrington, these features intended to construct a new facility that hosted not only some powerful exhibitions but also encouraged visitors to pay attention to conservation of natural resources and biodiversity on the earth. As per its view, this museum is an exceptional and inspiring museum in terms of sustainability and green innovative applications.

The project of "evaluating the air quality at museum environments of Iran: on the way of green museums"

According to official reports of the Ministry of Cultural Heritage, Tourism and Handicrafts, there are more than 700 active museums in Iran that host some 4 million items and this figure increases day by day through various channels and mainly through archaeological excavations. As it was mentioned above,

museums usually need much more energy and resources to perform their social and cultural activities and to keep and preserve their collections compared to ordinary buildings.

The Research Institute of Cultural Heritage and Tourism of Iran is responsible for setting necessary standards and policies for conservation of properties. In line with its governing responsibilities, the Research Institute organized a symposium in 2015 where more than 70 people comprised of officials in the field of cultural heritage, curators, authorities from the ministry of cultural heritage, tourism and handicrafts, trustees of properties, and conservators at different private and public museums and ICOM-IRAN attended and exchanged ideas on challenges related to conservation and preservation of properties. As an output of the meeting, they introduced a project entitled "evaluating the air quality at museum environments of Iran: on the way to green museums" by which Iran step into the path of green museums. The goal of implementing this project is depicting an overall picture of the situation of Iranian museums as well as their needs and priorities that finally leads to some indigenous criteria and methods for rating green museums of the country. As a research-educational project, this project initially began in 2016 in collaboration with target museums in Tehran and then expanded to some other regions of the country.

Methodology

As a great volume of energy and resources of museums are consumed by construction costs, electric and mechanical equipment of museums and facilities needed for displaying items at museums whose performance qualities are reflected in the indoor air quality and indoor conditions of museums, the first steps on the path of green museums of the country were taken by assessing the air quality at museums. To conduct this assessment, some parameters namely temperature, relative humidity, corrosion potentiality, and concentration of Ozone gas as indicators for micro-climatic conditions, external pollutants, and air exchange rate were used. This evaluation was conducted by means of data loggers of relative humidity and temperature (TESTO 174H model) within -15minute intervals, metal coupons of copper, silver and lead, and Latex tapes in various spaces including halls, showcases, and reservoirs. These assessments ran for 6 to 12 months depending on the conditions of museums.

Previously, technical and general information of museums was collected by means of surveys which asked some questions concerning the construction date of buildings and establishment of museums, types of relics preserved at museums, types of materials of their showcases and furniture, heating and cooling systems, electric and lighting equipment, time and procedures for cleaning museums and properties, etc.

Climatic zones of Iran and the list of museums covered in this study:

With its high plateau, Iran is located in the northern hemisphere with warm climatic conditions. Architecturally-speaking, the climatic zones of Iran have

been divided into four main zones (Kasmaie, 2005) as follows:

- 1) warm and dry (Central Plateau of Iran)
- 2) cold and mountainous (mountainous regions in the west)
- 3) mild and humid (southern parts of Caspian Sea)
- 4) warm and humid (northern parts of Persian Gulf and Oman Sea)

Museums covered in this study included 33 locations at 9 museums in Tehran and 33 locations at 11 museums in other provinces (table 1). These provinces have scattered across the above-mentioned climatic zones. Other factors contributing to the selection of museums included their location in the city, types of the building (historical, new or old), their equipment, and importance of their collections. As the high number of museums existing in Tehran on the one hand and its status as a mega-city and diversity of locations in Tehran on the other hand, were two main reasons for selection of higher number of museums from the capital. It is worth mentioning that 10 other museums located in Kerman province, Central Plateau and borderlines of Central Desert that are under investigation but they have not been included in the present study since they have not been completed.



Figure 1
Geographical locations of museums studied across various climatic zones of Iran

province /City	climate	museum	museum code	building type	places studied
Tehran/ Tehran	Moderate and dry	National museum of Iran.	INM1	Historical	8
		Ancient Iran Islamic Archaeology and Art of Iran	INM2	And contemporary	
		Golestan Palace	GPM	Historical	5
		Nirvan Cultural Historical Complex	NPM	Historical	5
		Iranian National Museum of Science and Technology	STM	Historical	3
		National Museum of the Islamic Revolution and Holy Defense	HDM	contemporary	3
		Bath Sciences Museum	GM	contemporary	3
		Iranian Museum of Graphic Design	IGM	Historical	3
		Hayk Mirzayans Insect Museum	HMIM	old	3
West Azarbaijan/ Urmia and Khuy	Cold Mountain	Urmia Archaeological Museum	UAM	old	4
		Urmia Anthropological Museum	URM		
		Khuy Anthropology Museum	KhM	old	2
Kurdistan/Sanandaj and Neger		Sanandaj Archaeological Museum	SAM	Historical	4
		Neger Museum	NM		
Pars / Marvdasht	Moderate and dry	Persepolis Museum (Historical Site)	PSM	Historical	5
Hormozgan / Bandar Abbas	warm and wet	Persian Gulf Museum	PGM	contemporary	5
Gilan / Rasht	Moderate and moist	Rasht Archaeological Museum	RAM	old	4
Sistan and Baluchestan / Zahedan, Zabol, Saravan and Shahr Sokhteh	Warm and dry	Southeast Regional Museum Sistan Anthropology Museum Saravan Anthropology Museum strong of Shahr-e-Sokhteh site (historical site)	GSRM SiRM SaRM ShSM	contemporary	9
total		21			66

Table 1 - The list of museums and number of locations studied



Results and discussion

Field studies

Analyzing surveys on all museums covered, researchers found out that except for the Persepolis Museum that lacked any cooling or heating systems and ventilated naturally, in majority of other museums there were central heating and cooling systems and/or central air conditioners and stand-alone air conditioners. In other cases, museums used other heating and cooling systems such as fan coil units, radiators, evaporative coolers and heaters. Air handling units used lack filters specific to pollutant gases and their dust filters have not been replaced for years. Additionally, field inspections showed that in spite of existence of mechanical ventilators at these museums, their doors and windows are left open during hot seasons to facilitate the process through natural ventilations. Furthermore, as buildings of most of these museums are old or historic, lots of cracks and openings are in their doors and windows.

Apart from the Entomology Museum whose boxes and cabinets are made of natural wood and MDF, other museums make use of artificial woods such as MDF, fiberboards and chipboards, cloth, glass and metal for construction of their vitrines. Cabinets and shelves for keeping items in reservoirs are essentially made of metal. At the documentation centers and reservoirs of large museums, artefacts are preserved in cabinets with rails. In accordance with the field visits and reports of experts at museums, the periodic insecticide spraying is conducted at all museums on the regular basis. Cleanings are conducted daily, monthly and annually in various locations such as corridors, display halls, showcases and reservoirs as the conditions of any museums require. Cleanings are performed manually using ordinary stuff such as handkerchiefs, wet T washes, and occasionally vacuum cleaners. In spite of these efforts, dust could be easily seen on the surface of items in open spaces as well as the interiors of museums. This problem is greatly noticeable at museums of Sistan and Baluchistan province even at the large museum of the southeast that is equipped with air handling units using enjoying dust filters. Although light emitting diode (LED) lamps have replaced other lamps in some museums particularly the museum palaces, lots of museums still make use of florescent and halogen lamps. Apart from museum palaces and the large museum of the southeast of the country whose windows are directed at the natural light, some measures have been taken in other museums to shut the windows or darken them and make use of artificial light so long as that the intensity of light and destructive effects of ultra violet rays are controlled.

Some other issues notices in field inspections include some defects and problems related to museum buildings such as humidity, termite traces, the direction of entrance doors towards the interior of museums, and cracks and openings on walls.



Measurement of relative humidity and temperature

Measurement of relative humidity and temperature at museums covered by this study reveal that although the average rates of this factor fall within the acceptable range (table 2), some weekly, monthly and quarterly fluctuations could be seen there. This alludes to the inappropriate performance of cooling and heating systems as well as the great volume of air exchange with the external environment.

no.	city	museum code	temperature(°C)			relative humidity%		
			average	maximum	minimum	average	maximum	minimum
1	Tehran	INM1	26	31	23	30	49	14
2		INM2	24	31	21	30	54	10
3		STM	23	29	21	26	43	15
4		GPM	23/8	31/4	20/6	40/7	58/2	23/5
5		NPM	24	29	21	33	49	16
6		HDM	23/5	27/4	20	35	48/6	20
7		GM	21	23	18	46	62	
8		GMI	-	-	-	-	-	-
9		HMDM	24/5	29/5	17	28	47	23
10	Urmia	UAChM	25/5	31/2	21/4	21/4	50/6	11/7
11		UAnM	-	-	-	-	-	-
12	Khoy	KAM	19/4	24/8	15/8	34/6	60/5	20/1
13	Samsabuj	SAM	24/3	32/6	16/0	26/5	53/3	13/0
14	Negel	NM	28/2	32/7	23/4	27/7	43/3	21/7
15	Rasht	RAM	22/6	28/4	19/2	65/5	74/7	48/5
16	Bandar Abbas	PGM	22/7	26/6	14	52/8	73/3	34/9
17	Marvdasht	PSM1	16/5	21/0	13/7	33/6	59/3	20/3
		PSM2	15/7	18/7	13/5	34/9	56/2	21/9
18	Zahedan	GSGM	20/1	23	17	16/4	19	15
19	Zabul	SiAM	23	33	9	11/9	13	11
20	Saravan	SaAM	22/6	32	14	18/7	23	14
21	Shahr Sukhteh	ShSM	21/6	39	14	19/4	24	17

Table 2 - Data on micro-climates at museums inspected



Evaluating the corrosion potentiality of the environment

Visual inspections of metal coupons and changes in their appearances indicate that the greatest changes in color of tarnishing could be seen in silver coupons particularly those inside the halls and reservoirs. This change in color could vividly be seen in silver coupons inside the showcases. Existence of recovered sulfur gases in the environment of museums as well as enormous air exchanges inside display cases result in such a change. Lead coupons inside showcases show the maximum amount of color changes that are whitish. Such a change is due to organic acid gases released from materials used in making showcases such as various types of natural and artificial woods. Existence of openings in vitrines prevent further accumulation of such pollutants inside. Consequently, these pollutant gases and dust of external environment find ways to get inside. No visible changes were seen in copper coupons. Results of colorimetric analysis for quantitative measurement of color changes in coupons have been presented in table 3. According to the results of this study, the greatest changes in colors are visible in coupons of Sistan and Baluchistan that are possibly due to accumulation of so much dust on these items.

no.	city	museum code	domain color change coupons (ΔE)		
			Pb	Ag	Cu
1	Tehran	INM1	Pb	30-85	5-8
2		INM2	2-7	30-45	3-8
3		STM	2-5	30-40	<5/5
4		GPM	7	30-80	<5
5		NPM	5-15	40-51	<7
66		HDM	2-15	24-40	<5
7		GM	6-16	36-51	3-10
88		GMI	9-15	22-43	<4
9		HDM	2-8	28-52	<7/1
10	Urmia	UAxM	13-22	34-1878	3-29
11		UAnM	19-155	686	11
12	Khoy	KAM	31	215-487	<3
13	Sarandaj	SAM	34-55	555-975	14-33
14	Negel	NM	4-28	989	-
15	Rasht	RAM	11	840-1287	6-32
16	Bandar Abbas	PGM	19-144	1835-384	8-64
17	Murvdasht	PSM	28-233	660-991	0.2-20
18	Zahedan	GSRM	1-67	246-920	70-186
19	Zabol	SIAM	17-31	290-434	45-36
20	Saravan	SaAM	21-33	309-1121	45-94
21	Shahr Sokhteh	SbSM	33-36	669-892	40-58

Table 3 - Comparing color changes in metal coupons using colorimetric analysis



Estimating Ozone concentration

Ozone concentration estimation based on the time needed for rupture of Latex tapes in contexts of this study (table 4) indicate that the highest concentration of this pollutant, as the indicator of traffic pollutants, is related to museums located in urban areas and locations close to busy streets. The high volume of air exchanges rate at museum buildings plays an important role in increasing ozone concentration in internal environments. For this very reason, the concentration of this gas in infinitesimal inside showcases and it cannot be estimated. In some cases, the rupture and color change in Latex tapes are due to the effect of light of lamps inside the vitrines or the display hall that has happened as a result of existing ultra-violet rays inside them. This color change and rupture differ from the effects of ozone.

no.	city	museum code	estimation of ozone concentration(ppb)	descriptions
1	Tehran	INM1	22-56	High air exchange with the outside environment
2		INM2	22-33	
3		STM	14-40	Internal ozone source (laboratory instruments)
4		GPM	10-20	
5		NPM	18-24	Internal Ozone Gas Source (Air Purifier)
6		HDM	13-18	
7		GM	<12	
8		GMI	37-40	High air exchange rate with the outside environment
9		HDM	-	Very little air exchange rate with the outside
10	Urmia	UAM	12-15	High air exchange rate with the outside environment
11		UAM	12	High air exchange rate with the outside environment
12	Khoy	KAM	6	
13	Samsadj	SAM	6-13	
14	Nagel	NM	-	Rural environment
15	Rasht	RAM	<7	
16	Bandar Abbas	PGM	<16/5	
17	Masvashat	PSM	-	not of the city
18	Zahedan	GSPM	-	Minimal air exchange rate during Corona pandemic
19	Zabol	SIAM	-	Minimal air exchange rate during Corona pandemic
20	Saravan	SAAM	-	Minimal air exchange rate during Corona pandemic
21	Shahr Sokhteh	SSAM	-	Outside the city and minimal air exchange rate during the Corona pandemic

Table 4 - Estimating ozone concentration at museums



Challenges

Climatic and cultural diversity of Iran create different social and physical environmental conditions that naturally affect the quality of the environment inside museums as well as its management. conservation of collections in each of these climatic zones require certain considerations for controlling micro-climates, indoor ventilation and lighting of museums.

Geographical location of all of these museums in cities and town and/or historical sites in suburbs require some further environmental conditions. Location of important museums close to busy streets or neighborhoods in large cities such as Tehran make them more accessible but gas pollutants and dust emanating from traffic as well as small and big industries in cities, make collections inside museums more susceptible to the threat of these pollutants.

Iran is located on the arid and semi-arid belt of the world and more than two-thirds of Iran's territories are arid and semi-arid. Additionally, the average rate of annual precipitation in Iran is %50 less than that of the world. Hence, Iran is exposed to dust both at local as well as regional and global levels (Dehghan Manshadi and Mani Kharanegh, 2019). Another big challenge inside museums is the particle pollution inside museums that remain of the surface of properties. Complete cleaning of these particle from the surface of relics is impossible or it shall result in exerting serious damages to properties.

Although the sun is regarded as an important and valuable source of energy in Iran, the threat of UV rays, forces museum practitioners to eradicate natural lights to a great extent at museums and make use of artificial lights. Another challenge for conservation and management of museum collections is the concerns related to making use of the natural light inside museum environment (as of the advantages of green museums) and procedures for reduction or omission of UV rays there.

Shortage of green materials or poor access to them in terms of their application at museums as well as lack of correct and reliable information about commercial products are among other challenges faced by curators and conservators. Consequently, they experience some tough predicament in choosing and purchasing appropriate materials.

People in charge of museums are encountered with another challenge namely huge cost of maintenance and restoration of historical building while taken into consideration the specific architecture of every climatic condition for changing application and creating controllable and suitable space for preservation of museum collections.

In light of unique identity of collections at every museums and different factors affecting the appropriate care of items, making use of green methods in conservation of collections is a complex topic since conservation of items against threats could be contributed to various factors such as controlling the micro-climate in the building, lighting systems, architectural design, indoor



and external air pollutants, resources at museums and waste disposal and management (McGraw, 2013 b, 10). Plethora of managers and conservation specialists appreciate the importance of integrating sustainable methods with ordinary methods of conserving properties, they are seriously doubtful for making any serious changes as there is no evidence proving that such methods would be appropriate for prevention of damages on collections.

Strategies

In light of availability of renewable energy resources such as wind and solar power in most regions across Iran, one of the important strategic plans to reduce fossil energy consumption is making attempts to attain these energies. As our ancestors made the minimum intervention in the environment and met their daily needs from the natural resources in a sustainable way, some traditional methods would be inspiring for new ideas (Ahmadi, 2003). Some of sources of inspiration include paying attention to the history, traditional methods and past experiences in tandem with every region and climate condition such as wind towers for ventilation, selection of earthen materials for construction, building thick walls to insulate buildings, taking into account human welfare inside buildings compared to the outside, constructing domes as roofs to minimize solar heat absorption during summers in desert areas, making use of colorful and small windows and building shades in buildings for controlled utilization of the natural light.

Sustainability requires adaptability of the man to modern environmental challenges through changing his culture in terms of values, views and habits related to the environment (Worts, 2006). Museums would contribute to such a change by means of promoting these adaptations, education and public awareness raising. Therefore, green museums would create the sustainability culture by means of selecting types of items for collection and display and planning for production of information and education.

Some other effective plans for this goal include cooperation with institutes and centers active in the field of the environment and energy consumption to receive assistance and consultation in terms of implementation of environmental ideas such as water management, green space, repairing old facilities for reuse at museums, etc.

Sustainability of museums is a transformative process and its policies vary across museums depending on their conditions such as the staff number, budget and relevant missions. Sustainability at museums require three essential elements namely linking the green methods with the mission and goals of museums or integrating these methods in the strategic documents of museums, gaining information about green methods or reasons of integrating these methods in strategic documents of museums, and having efficient management and leadership to implement green methods.



Requirements

Lots of Iranian museums are located in historical buildings. Considering criteria for green museums, such locations are regarded as an advantage since it would omit expenditure for constructions. However, due to the old age and wear and tear of materials used in these buildings, they are in dire need of paying attention to their important parts such as roofs, floors, external crusts and fastenings in order to prevent problems inside museums such as excessive air exchanges, entrance of pollutants from the air, temperature fluctuations, relative humidity, pests, water leakage, humidity, and the like.

Preventing excessive energy consumption and improving the performance of air handling units are some other requirements of this policy. Conducting regular inspections and necessary repairs in electric and mechanical equipment (such as air handling units) together with necessary adjustments not only improve the quality of their performance but also would contribute to reducing energy consumption and preventing threatening dangers such as fires. In some cases, it is recommended and required to replace these equipments with new ones. Although it might incur some cost, it would make up for the cost in the long term due to energy savings.

Organization, appropriate arrangements and efficient cleaning of reservoirs could play an important role in preventing pests and excessive use of chemical pesticides. Therefore, integrated pest management (IPM) is one of the most effective methods for pest control and it would contribute to preservation of historical collections, human health and the environment.

Safe and efficient light sources (LEDs) that are UV-free as well as installment of sensors to turn off lights at museums when there are no staff or visitors are other requirements for museums. Although LED lamps are more expensive than other lamps, this expenditure would be compensated in the course of time as a result of enormous energy savings. Some measures should be given priorities such as separating items sensitive to the light from others for making use of the natural light for their display through creating appropriate conditions for their right locations in terms of their distance to the light sources, installments of filters and anti-UV curtains.

It is required to have sufficient information about characteristics of materials or consult with relevant specialists for choosing these materials to be used at museums for conservation and restoration of properties, decorations, and interior furniture. Not only do these measures prevent threats of pesticides, pollutant gases and damages to properties and harming staff, but also reduce energy consumption and production of detrimental materials which consequently mitigate negative environmental impacts.

Presenting creative ideas and views at brainstorming sessions and/or taking necessary measures in any fields related to stepping into the path of the green museum are important and necessary. Such ideas cover a wide range of inputs from simple ones such as using recycled and old materials for temporary



exhibitions, and water consumption savings to encouraging visitors to make use of bicycles and public transportation to have access to museums, getting familiar with traditional and sustainable methods of using the environment in proportion to every geographical regions and installment of solar panels for energy production. Needless to say that having a leader for necessary planning and guidance in terms of implementation of green methods is highly required. Presence of conservation specialists at museums for consultation and appropriate care of collections would play an important role in implementation of green methods.

Epilogue

Prior to the emergence of movements dedicated do sustainability and green buildings, the preventive conservation has been playing prominent roles in setting the ground for museums to get on the path of sustainability and green museums. These roles have in line with the motto of the preventive conservation as "prevention is better than cure". In other words, lots of green measures are based on approaches and methods of preventive conservation that cover all three main pillars of social, economic and environmental sustainability. Therefore, one could say that the concept of green museums is comprised of a collection of three concepts namely sustainability, green buildings and preventive conservation. Assessment of green museums require official regulations and criteria. Although it is difficult to develop regulations for a process and supervise them, such a task would guarantee the quality and commitments of museums in Iran. Drafting criteria for green museums in Iran would be the second part of this project.

Acknowledgment and appreciation

The researchers would like to seize the opportunity to appreciate partners of this project at the Research Institute of Cultural Heritage and Tourism of Iran, and the Research Center of Conservation and Restoration of Cultural and Historical Relics. Supports and cooperation of museums studied in this research as well as ICOM-Iran should be appreciated, too. We would like to extend our thanks and gratitude to the Budget and Planning Organization for its support and provision of finances to advance the programs of green museums across the country.

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7- A Report on Open-Air Museum of Shipbuilding and Sailing in Gouron Village, Iran

Maziar Qaseminejad Abdolmalaki

Theme: Museum Exhibition about Environmental issues

Learning Objectives: To share lessons learned in a real experience on how to finance, design and work with local people, how to revitalize a valuable legacy.

There is no wind to fill the sails of the Gouron people and an engineering heritage could become extinct within one or two decades if this tide-over continues.

Qeshm Island is a free-trade and visa-free zone located in the Persian Gulf, Iran; an excellent destination for domestic and international tourism. Covid-19 aside, the island welcomes more than two million domestic tourists each year, which represents a considerable development opportunity. According to the JICA (Japan International Cooperation Agency) Project Team, 130,000 people visit natural and rural areas every year. In addition to making money, the islanders use this unique opportunity to train their guests as well. They turn tourists into visitors by their unique humble culture.

The islanders are far better at understanding their responsibilities to the next generation and their commitment to the people of the neighboring countries than the centrist politicians, because of their history and the direct and indirect educational activities conducted on the island in the recent years.

It became increasingly apparent to them that mass tourism and unfair competition would destroy their natural and cultural resources. They discovered the importance of biodiversity, fishery, landscapes, lifestyle, traditional arts, etc. and experienced how to use them in a sustainable manner. This is why the people in Gouron village also aspire to keep the flag of their shipbuilding and sailing skills up. Through this existing advantage, they would have a significant difference from neighboring communities. However, they know how to balance it with the concept of "growing together" with other villages. Young people from Gouron village are excited about their museum and see it as a ladder to access international markets for sending peace signals to whom they have been in contact for many centuries.

It is located on the verge of the Hara mangrove forests which carries several national and international labels, including the UNESCO Man and Biosphere Program, the Ramsar Wetlands Convention, Protected Area, and is named as one of the important geosites of Qeshm UNESCO Global Geopark. It seems that Gouron's long history of settlement has not been thoroughly investigated.

UNESCO listed the traditional skills of building and sailing Iranian Lenj Boats in 2011 on its Urgent Safeguarding List. The idea of creating an open-air museum in the shipyard's area was proposed by the locals of Gouron to JICA team and



QFZO (Qeshm Free Zone Organization) in 2016 as the first step to conserving this set of arts and engineering legacy. Eventually, a primitive museum has been created with a limited budget as one of the pilot projects of the JICA Project and cooperation of Departments of Geopark and Tourism of QFZO. The project aimed to preserve arts and skills that are getting vanished while they can lift up households' livelihoods based on their natural capacities.

A range of activities, not limited to these, were planned and implemented. QFZO allocated 63 hectares of the lands that embrace five traditional wooden shipyards and handed it over to the council of the village to develop this special museum; a local trainee was selected and dispatched to Japan to attend some specialized courses; a simple development plan was formulated; a legal corporation was established for rural tourism; some young villagers were trained as local tour guides; a playground, a handicraft market, an office, a ticket booth, and sightseeing routes with decent signs, were built; then a new jetty was installed by the Ports and Maritime Organization.

The museum was opened to the public in March 2018 and as a result, thousands of tourists visited that area, learned about the sailing and engineering capabilities of the islander's predecessors, while the Gouron Cooperative members found a golden opportunity to practice teamwork, discover their intrinsic values, sell products to tourists, and participate in a wise competition with the neighboring villages, and contemplate big dreams for the village, the island and the region. I was impressed by their great work with bare hands, so I have always tried to assist them as much as I can. In two years, they grew from 39 members to 99, hosted more than 30,000 tourists, and designed great projects based on their natural advantages. They teach us with passion about their traditional knowledge about tropical marine forests, ancient waterways, trade of goods on long-haul sailing, sell geopark and mangrove tours, and promote their traditional handicrafts. Through these events, they instruct us on the importance of responsible tourism, and now, they are thinking of ambitious dreams.

One of their daring dreams is to build a 100-foot fully wooden sailing ship, which was called Sandbad Boom for tourism purposes, not cargo. This wonderful idea is endorsed by some national bodies like the Ministry of Cultural Heritage, Tourism and Handicrafts, QFZO, Ports and Marine Organization, and the International Council of Museums. I am proud to be volunteering for this project along with Ms. Yasaman Ismaili and over 20 expert volunteers. We have already designed the overall features of the vessel with the local masters, but due to financial constraints so far we have not had to shovel the ground yet.

In order to bring back life and hope to the community, we welcome any opportunities to work with other national and international charities or organizations. We hope that this museum will inspire people who look forward to realizing similar socio-environmental friendly projects in the future.



8- A Review of Legal Protection of Natural Heritage in Iran

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Abstract

In spite of the advanced principle for conservation of Environment which is endorsed in the Iranian Constitution and the ratification of the UNESCO Convention concerning the Protection of the World Cultural and Natural Heritage 1972 (WHC) by Iranian Parliament since 1974, we find a still period which was terminated by inscription of Damavand Summit as the first in the National Natural Heritage List in 2008.

From 2008 to July 2021, Iranian State has inscribed 770 natural properties as the National Natural Heritage and even Lut Desert and Hyrcanian Forest as the World Natural Heritage in UNESCO World Heritage List in 2016 and 2019.

Inscription as one of the requirements for conservation of natural and cultural properties provides the necessary conditions for protection and conservation under the umbrella of the Law.

Due to the diverse climate and environment in Iran, we enface various and vast rules and regulation in Iranian Environment law but we will focus merely in legal protection and conservation concerning to Iranian natural heritage by answering to following questions: what legal measures and tools for conservation of natural heritage are provided and how much these measures could be effective and efficient.

In this regard and based on description and analysis of the related legal texts, firstly we will identify and precise the natural heritage notion and then by determining the current laws, we will review the scope of legal protection and their efficiency.

Key words: Natural Heritage, National Heritage, Act of Statute of Cultural Heritage and Tourism Organization 2005 (ASCHTO), Act of Conservation and Reform of Environment 1974(ACRE), Convention concerning the Conservation of the World Cultural and Natural Heritage 1972 (WHC)

Introduction

Safeguarding and conservation of nature and environment has historical and cultural roots in Iran , for instance, in ancient Iranian tradition, the pollution of water, soil, fire and air as the essential elements of nature and damage to the



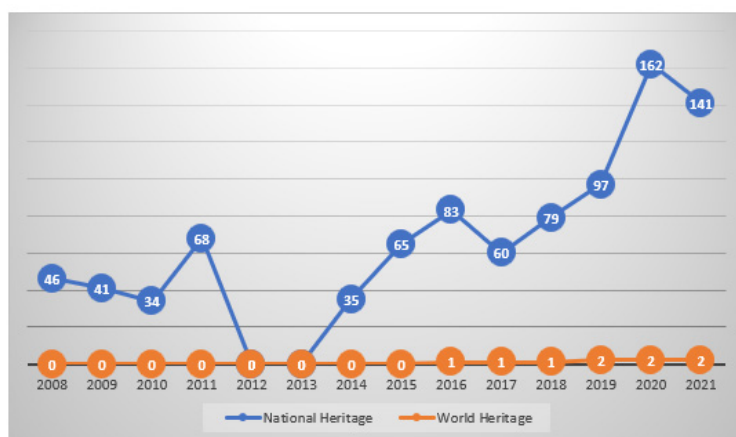
aged trees have been shamed.

Thanks to geographical extent, Iran enjoys climate diversity which causes the natural and cultural heritage diversity and natural heritage, as a part of the Iranian environment represent the natural identity and history also.

Generally, by importance of the subject of environmental conservation in 70th decade when the Stockholm Declaration emphasized the necessity of protection of the environment as the human common heritage, the circumstances for conservation of World Natural Heritage as the outstanding natural environment was provided.

Iran as one of the pioneer member states ratified the UNESCO Convention Concerning the Conservation of World Cultural and Natural Heritage in 1974 through the National Parliament, so as the first legal documents in the field of natural heritage, WHC became an important legal document in Iranian law system.

Nevertheless, Damavand Summit registered in Natural Heritage List, as the first Iranian natural heritage, 34 years later after accession to WHC in 2008 and then this process was augmented. Now, 684 natural heritages are registered as national natural heritage and in 2016 and 2019 Lut desert and Hyrcanian Forests were registered in the World Heritage List.



Sources: *Natural Heritage of Iran vol1*

Sources: *Natural Heritage of Iran vol1*

On this occasion, we intend to review protection of natural heritage in Iran by studying the Iranian legal documents and administration in order to find how effective these attempts are for protection of natural heritage.

For this purpose, the basic legal texts which are involved in the national registration process, as an initiative for protecting natural heritage by law, are chosen.

This review will be presented, firstly a definition of natural heritage in Iranian law then by collecting the related legal texts in this context, the legislative mechanisms

are identified. In this manner, administrative mechanisms for implementation will be considered.

A. Definition of Natural Heritage by Iranian Law

The UNESCO Convention concerning the Protection of World Cultural and Natural Heritage is one of the most important legal texts which defines natural heritage and determines the various forms of natural heritage (Article 2). This convention is valid as equal as a domestic law, so the definition on natural heritage in this convention could be considered as the first in Iranian legislation.

Referring the Article 2 of WHC1972, natural heritage considered as following formations:

- Natural features consisting of physical and biological formations or group of such formations, which are of outstanding universal value from the aesthetic or scientific point of view.

Geological and physiographical formations and precisely delineated areas which

- constitute the habitat of threatened species of animals and plants of outstanding universal value from the point of view of science or conservation.

Natural sites or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation of natural beauty.

In this article we could find three formations: the most important element is the outstanding value which is the common element in the different points of view and for each formation there are various and different points of view.

- By inspiration for Article 2 of WHC 1972, for the first time, the Iranian legislator used the term Natural Heritage in the Note of Article 2 of the Act of Statute for Organization of Cultural Heritage and Tourism 2003.

Between 1973 to 2003 we found other legal texts in the field of the environment such as the Act of Preservation and Reform of Environment 1975 and its by-law executory which used the term of National natural property or National Park.

From a legal point of view, the terms of "Natural Property" and "Natural Heritage" may have different modes which could take common form. It means any natural heritage is inevitably a natural property but each natural property could not be considered as a natural heritage.

Natural heritage defines in the by-law executory of Note of Article 2 of ASCHTO as "the natural geographical sites and specific areas of country where determine, conserve and exploit due to its specific physical and biological quality or beautiful and rare natural landscape and/or natural-historical sites and outstanding fauna and flora species and their habitats." This definition of natural heritage is illustrated by the definition referred in Article 3 of the by-law executive of Act of Protection and Reform of Environment 1975 is close to what defined in WCH1972 but originality as an important element is added to this definition by using the term "natural – historical sites" beside the terms of "outstanding fauna



and flora species and their habitats".

As a recent redefinition for Natural Heritage, the Section 1 of Article 1 of the Executive Order for Protection and Sustainable Exploitation of Natural Heritage, added as a characteristic the item of "Physical and cultural interchange between Human and Nature" also which enriched this definition in comparison to the previous definitions.

Now, by identifying the limits of the concept and definition of natural heritage in Iranian Law, we could examine the legislative and administrative mechanism for protection of natural heritage in Iran.

B. Legislative Mechanisms for Protection of Natural Heritage

It is clear that natural heritage is a part of the environment so, generally, protection of natural heritage could be reviewed through the public law and the specific laws for protection of environment also. In this regard, by reviewing the place of the environment in the Constitution of the Islamic Republic of Iran and other related public laws.

Referring to principle 50 of Iranian Constitution, "Protection of Environment which belongs to the current and future generations for their growing social life, is a public duty. For this reason, economic and other activities which pollute the environment or cause irrecoverable destruction are forbidden."

This principle as a developed legal protection of the environment extends to natural heritage which is a part of the environment. Therefore, protection of natural heritage is a collective responsibility and a public duty and its destruction is forbidden too. The consequence of this approach provides the conditions to some extent that the Islamic penal law expresses the environmental crime and prohibits the destruction of the environment, the destruction of natural heritage to be included¹.

Of course, as the Ministry of Cultural Heritage, Tourism and Handicrafts has legal responsibility for protection and exploitation of natural heritage, it would be better to not have away the Chapter 9 of Islamic Penal Code concerning the crime against cultural heritage and their punishment, even there is no explicit terms for natural heritage yet².

In addition, there are some specific laws for protection of environment in Iran such as: Act of Protection and Reform of Environment 1975, Act of Preservation and Protection of Natural Resources and Forest Reserves of Iran 1992, Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat 1971 and some other specific protectional law which could protect directly and generally natural heritage or due to specific forms of the natural heritage could be protected by specific laws. Thus, there are a range of rules for protection of natural heritage in Iran that in some of them the executive

1- Articles 690 & 615 of Islamic Penal Code

2- Article 569-558 of Islamic Penal Code



mechanisms are foreseen.

But not to forget that the WHC 1972 is the main legal text for protecting natural heritage and determining the limits and the scopes.

C. Executive Mechanisms for Practical Protection of Natural Heritage

In order to review the executive mechanism, we need to benefit from the resulting legislation in order to know by who and how the natural heritage is protected practically in Iran.

We found that WHC 1972 is the most important basic law for protection of natural heritage. However, the conservation and protection aimed by this convention is not only extra-territorial but also referring to the item 2 of Article 3 of the said Convention, it covers the national natural heritage too. In this regard, the Iranian legislator affirmed and underlined in the Note of Article 2 of ASCHTO the commitments and obligations which should be considered for protection of natural heritage as a guideline and engaged the Cultural Heritage & Tourism Organization (Now Ministry of Cultural Heritage, Tourism and Handicrafts) to prepare a by-law executory for exploitation of the natural heritage of country and implementation the legal engagements posed by WHC 1972 in coordination with the Department of Environment.

By referring to this Act, the Ministry of Cultural Heritage, Tourism and Handicrafts and the Department of Environment are known as two main organizations identified by law for protection, conservation and exploitation of the natural heritage commonly.

So, we will have a brief and rapid look at the units which are involved in natural heritage in order to find how they are successful to implement the law and do their duties by law.

In Ministry of Cultural Heritage, Tourism and Handicraft, the Office for registration of Zone and Conservation of Tangible Heritage and Safeguarding of Intangible and Natural Heritage and the Research Group of Natural Heritage of the Research Institute of Cultural Heritage and Tourism are two main unites which involved directly to natural heritage issues.

Research and studies on natural property in order to file them for national and world heritage nomination, preparation of the guidelines and codifying them for conservation and registration are their common duties. but there are some complementary duties for the Registration Office such as regular monitoring, reporting, observing and promoting the registered national and world heritage for involving the society at different levels in registration, reformation and zoning and also supervision of the law and the WHC1972.

Other hand, the Department of Environment is the main governmental organization in Iran involves to Protection of Environment in different forms including the National Park, Nation Protected Zone and National Properties, but this organization is engaged to have the collaboration with the Ministry of



Cultural Heritage, Tourism and Handicrafts for exploitation and implementing the WHC 1972 for protection of natural heritage.

By considering the vast duties of the Department of Environment, the office of Habitats and Area Affairs and High Council of Environment are involved in natural heritage. The first one is occupied to general conservation for Protected Areas and Habitats, management and planning for exploitation of these areas and the High Council of Environment involved to determine the National Park and National Natural properties and their zones of protection, so it seems that this duty is in parallel with some of the duty of the Office of the Registration in Ministry of Cultural Heritage, Tourism and Handicrafts but we should remark that these duties are explicated by Article 3 of the Act of Protection and Reform of Environment 1975.

In this review, we could find a challenge in administrative Registration and conservation of natural heritage which is made by law. The two organs with similar duties have serious trouble. In spite of the by-law executory of Act 2003, they never have successful collaboration for conservation of natural heritage although the said by-law executory determine their duties separately in Articles 4 & 3. ¹Other hand, in Article 5 of this by-law, the Forests, Range, Watershed Management Organization – affiliated to the Ministry of Agriculture – is joined for protection and sustainable exploitation of natural heritage.

This guideline, which is codified and publicized officially in 2020, has redefined in section 1 of Article 1 the natural heritage and engaged the Ministry of Cultural heritage to register the natural heritage by coordination with the Forests, Range, Watershed Management Organization². This obligation has overlapped with the Article 6 and 17 of the by-law 2003 in registration of World natural heritage where mentioned the Cultural Heritage and Tourism Organization is engaged to act in coordination with the Department of Environment.

So, this pluralism in management and the ambiguity in legal texts not only make the difficulties for administration but also for legal proceedings in trials and beside the subject of the destruction and damage to environment which is mentioned in Article 14 of the Act of Protection and Reform of Environment, the crucial problem duplicates; because referring to the above - mentioned Article merely the Department of Environment as the private claimant could sue a claim.

Conclusion

In this review by considering a limited approach, the Iranian legal texts for protection of natural heritages were assessed but the crucial challenges in legal proceedings and the threats which are caused through this plural and vague legislation and administration need further research.

However, the registration is one of the most important manner for protection of natural heritage either as national natural heritage of world natural heritage, the

1- Article 3: The Cultural heritage and Tourism Org. should identify, research, register, zone and exploit the heritages in subject of Section (a) and (b) of the by-law and the known heritage shall be managed by this organization.

Article 4: Areas and heritage subjects in sections (c) and (d) of Article 2 are under supervision and management of the Department of Environment and this Department is responsible for current duties for their determination, conservation and exploitation

2- Article 5 – the by-laws for sustainable exploitation of Iranian natural heritages shall be jointly ratified by the Presidents of the Cultural Heritage and Tourism Organization, the Department of Environment and the Forests, Range, Watershed Management Organization

3- Article -6 The Department of Environment, is the representative of the State for the sites and areas under possession of State and national resources situated in quadripartite areas mentioned in sections (C) and (d) of Article 2 of the present by law.

Article 7 – The Registration of natural property of county based on Articles 4 & 3 of the present by-law will be done in case by cultural heritage and Tourism Organization or the Department of Environment



Iranian authorities neglected to develop the other issues which is legislated or should be implemented through WHC 1972 including the judicial, administration, technical, scientific and promotional activities and international collaborations which are foreseen in Article 5 of WHC explicitly.

Finally, it should be noted that the legislation and administration are not sufficient and effective for protection of natural heritage and it is necessary to establish a national specialized center which could plan, consult, manage, supervise, implant and build up the protection of natural heritage. By this way all the aspects of the WHC could be implemented more than merely inscription.

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Executive Order for Protection and Sustainable Exploitation of Natural Heritage

UNESCO Convention concerning the Protection of the World Cultural and Natural Heritage 1972

9- Hayk Mirzayans Insect Museum

Mohsen Mofidi-Neyestanak (PhD)

Iranian Research Institute of Plant Protection (IRIPP): Assistant Professor in biosystematics, Insect Taxonomy Research Department & curator of Orthopteroidea at **Hayk Mirzayans Insect Museum (HMIM)**, Head of the Department of Agricultural Zoology;

Agricultural Research, Education and Extension Organization: Strategic Planning Commission Fellow for planning the Mega Plan of AREEO Genetic Resources and Biodiversity

The plateau of Iran is a vast area with several wonderful climatic and topographic characteristics, I am pretty sure you know. Very high altitude to lowland deserts, from cold to warm places, etc. This has made Iran have a relatively diverse and unique biota, I mean plants, animals and microorganisms.

Iran is located in the Palaearctic region; however, several elements from the



Oriental and Afrotropical ecozones have influenced the Iranian fauna. The Iranian Research Institute of Plant Protection was initially founded in 1923 spotted with a local office to combat pests and diseases. That local office was then developed and progressed by remarkable efforts of several great Iranian scientists and moved to a series of modern labs and offices. The compilation of research offices and modern laboratories were named since the year 1943 as "Plant Pests and Diseases Research Institute" and finally as the "Iranian Research Institute of Plant Protection, IRIPP".

The national herbaria and reference collections of the plants, fungi, weeds, non-flower plants, pharmacological plants and carnivorous plants, several zoological reference collections of the birds, rodents, mollusks, spiders and mites, the national collections of bacteria, nematodes and viruses are regarded as extremely priceless national heritage, all deposited in the IRIPP. The insects are the largest assortment body in IRIPP. Several national reference collections of insect orders are deposited there.

In 1945, three Russian entomologists, Drs. Alexandrov, Chovachin and Kiriokhin, invited a few interested entomologists including young Hayk Mirzayans (1920 -1999) in order to conduct a faunistic study on the insects of Iran. He was 25 years old and just had finished his master's degree in the field of plant protection in University of Tehran (the then Madrese-ye A- ye Falahat-e Karaj).

Mr. Hayk Mirzayans increased the number of the entomologists involved in the project including the late Pazuki, the late Boroumand, and the late Farahbakhsh as the 2nd generation scientists. It continued and they trained the 3rd generation. I guess I am one of the 4th generation crew working in the museum, whilst at the moment the 5th and 6th generation entomologists are doing their best to improve the museum.

Mr. Mirzayans compiled huge number of classified insects, sorted out in several saloons. His knowledge of several languages (including Russian, French, Armenian and English), and his gentle charismatic characteristics made him a unique researcher amongst his colleagues.

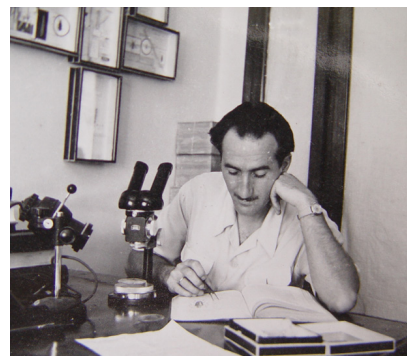
I have always been proud of being his student and co-worker for almost a decade. In 1962, the insect collection was transferred to a department that was later named "Insect Taxonomy Research Department, ITRD".

In 1999, Mr. Mirzayans passed away after more than 50 years working on the insect collection. This valuable gathering was named after its founder by the then Agriculture Minister, Dr. Kalantari, as the "Hayk Mirzayans Insect Museum, HMIM".

Since then, the HMIM staff have managed to conduct numerous expeditions across the country to collect more insects to progress the collections within the museum.

At the moment, HMIM is the largest insect collection in the Middle East with over 4.5 million insect specimens, including 25,000 local species, hundreds of primary types and paratypes, and a representative collection of exotic insects.





It has made the HMIM a leading national institute for other research and educational institutions in the country because of its crucial role in biodiversity studies and applied entomology.

What we do at HMIM? The answer is implementation of research projects on collecting, identifying, taxonomy, and phylogeny of Iran insect fauna, as follows:

- Insects› faunistic and biodiversity investigations,
- Modern bio-systematic studies such as cytogenetics, biochemistry, comparative morphology, molecular techniques,
- Cladistics, and biosystematics, speciation, population studies on major crop pests and zoo-geographically significant species,
- Preserving specimens at scientific standards,
- Supplying insect identification needs for other institutions,
- Holding workshops and symposiums on insect taxonomy,
- Co-working with universities and higher education centers on scientific exchanges and student supervising,
- Providing and publishing online and offline databanks for Iranian insect fauna.

Due to various reasons, such as human interference in the order of nature, climate change and environmental and ecological changes, the expansion of agricultural and food exchanges with other countries, the Iranian insect fauna is subjected to permanent changes.

General and public HMIM visitors are usually amongst high school and intermediate students with fascinating interest to discover the insect's world. They are highly perceived to be given less complicated information in a frame of cultural education at HMIM. Several groups of general visitors were used to visit each week to the Permanent Exhibition of IRIPP and HMIM before COVID-19.





10- The activities of the Geoscience Museum of Mashhad (GMM) in environmental protection: Maintenance, Awareness and Participation

Nastaran Shojaei kaveh

Geoscience Museum of Mashhad, Iran

Abstract

Advances in technology and human needs have led us to the increasing use of the earth's resources, the way in some places, even the morphology of the earth has changed, and as a result, the climate and life have been affected deeply. We have only one planet to live on. It is our duty to maintain and protect it so that future generations can live on it too. At the GMM, three main tasks have been defined: Maintenance, awareness and participation. At first, earth science documents such as rocks, minerals and fossil samples are collected, especially in relation to geological features of our country. Collecting these samples, in addition to increasing research facilities for current and future researchers, also prevents their destruction and loss. The other important task in the GMM is to inform people, especially the next generation. First we make them familiar with the earth and geological phenomena, in order to gain a better understanding of the earth, its valuable resources and the importance of preserving it. This is taught in various galleries of the museum. Then for making sure they get the point, we have them participate in some activities such as painting, playing, talking, etc. especially in schools.

Keywords: Geoscience Museum, environmental protection, geological phenomena, Iran

Introduction

The Geoscience Museum of Mashhad (GMM), is located in the Mashhad in North East of Iran. It was established in 2018 with the aim to collect geological samples and documents in order to protect them from accidents and to preserve samples for the future generation and then acquainting people with issues related to earth sciences. In the field of environmental issues, this museum has undertaken the mission of informing people with the characteristics of the earth and geological concepts, spreading the culture of inquiry and responsibility in relation to our habitat planet.

Science museum's, as a scientific institution, tell us the story of the development and evolution of human societies. Gaining various experiences over the years has taught human beings how to live, interact with the environment and protect it, which should be presented by museums (Taheri et al).



One of the basic missions of museums is education. In fact, a museum has the ability to provide effective and complete cultural education due to its comprehensive facilities, including space, tools and materials, and due to its rich collections.

The museum today is regarded as an institution that must have a strong relationship with, and responsibility towards, society (Boylan, 2004). Museums are able to serve a wide range of multidimensional services. Therefore, our museum has specified the tasks that we will deal with after this short introduction.

1. GMM's main tasks

Human activities and advances in technology have led to the use of more and more Earth resources. In some places, even the morphology of the planet has changed, and as a result, its climate and life have been affected. We have only one planet to live on. Do we have the right to sacrifice it for technology? On the one hand, we cannot stop the advancement of technology and the impact it has on the planet, and on the other hand, we can't close our eyes to the proportion of this planet and life for children and future generations.

Geologists deal with the earth the most. They examine the earth layer by layer, study rocks, minerals and fossils, identify existing mineral resources and potentials. They identify the natural hazards of the earth, and at the same time offer solutions to prevent some of the dangers caused or increased by humans. What is the benefit of all this knowledge and experiments not exposed to the public eye, no effect on people's lives and are left only in libraries and in the labyrinth of texts and forgotten? This is where the role of museums like the GMM comes into play. Museums are not legislators. Museum owners are not consulted on the optimal use of water resources, to replace clean energy with fossil fuels, and to protect the environment in general. But that does not mean we can do nothing. Museums may inform people about their duties, responsible and also their rights.

The most important environmental issues in this museum are:

- Paying attention to the non-renewable nature of land resources and the importance of preserving these natural resources
- Methods of controlling mineral pollution
- Water crisis and its importance
- The importance of scientific supervision over human constructions such as dams, urban planning, canals, etc., which can lead to aggravation of geological hazards such as floods, subsidence and landslides
- The importance of clean energy and the potential of countries in this regard
- Practice individual role-playing in order to pay attention to environmental issues and then try to preserve the planet on which we live.

To achieve the stated goals, we have identified three main tasks in the GMM.

1.1 Maintenance

In the first step, we have tried to collect and preserve earth science documents



such as rock, mineral and fossil samples especially in relation to the geological features of our country. Having a safe place to store these documents is one of the tasks that we have been seeking to accomplish by providing a suitable software system and repository (fig. 1). We asked for help from the earth scientists to collect samples and documents, and at the same time we researched and held to fields. All samples are identified and classified according to scientific categories with the help of experts and specialists in earth sciences. Although the most attractive specimens for public viewing are in the museum exhibition, most of the reserves are kept in the repository for study and research.



Figure 1 - Several kinds of storage in repository of GMM

A: Drawer for thin sections, B&C: drawers for fossils and minerals, D: storage for Rocks, E&F: storage for soil and geochemistry samples, G: Boxes for drilling boreholes, H: view of repository. Collecting these samples, in addition to increasing research facilities for current and future researchers, prevents wasting time and money on re-traveling. At the same time, there is always the risk that due to unregulated perceptions and the intervention of non-experts and environmental problems and even political interventions, some resources will be lost or it will no longer be possible to provide samples.

At present, we are one of the few places for systematic storage of geological samples in the country and about %90 of our samples have identification cards. In the current situation, despite the Corona virus pandemic, most of our activities are focused on registering existing samples and collecting new ones (fig.1).

1.2 Awareness

At the same time, we have another task. One of our most important tasks at the museum is to inform people; I emphasize the general public; and especially the next generation of the country, with the earth and geological phenomena in order to gain a better understanding of the earth and its valuable resources and the importance of preserving it. How do we expect people to use water properly,

who do not know the relationship between uncontrolled and unprincipled water abstraction and land subsidence? Or how people who do not yet understand the effect of greenhouse gases on global warming and climate change, could take the lead for using less fossil fuels and using from clean energy instead? How to build earthquake-resistant structures without knowing the tectonic and seismic sensitive points of the earth (fig. 2)?



Figure 2 - Provide information on earth sciences and environment to various visitors

In different galleries of the museum, geological phenomena and hazards are introduced and the reason for their occurrence is explained with the help of replicas, films and teaching aids. In this way, we encourage them to better understand the current state of the earth by searching and discovering the past, to establish a better connection with the dynamic planet we are living on (fig. 3).



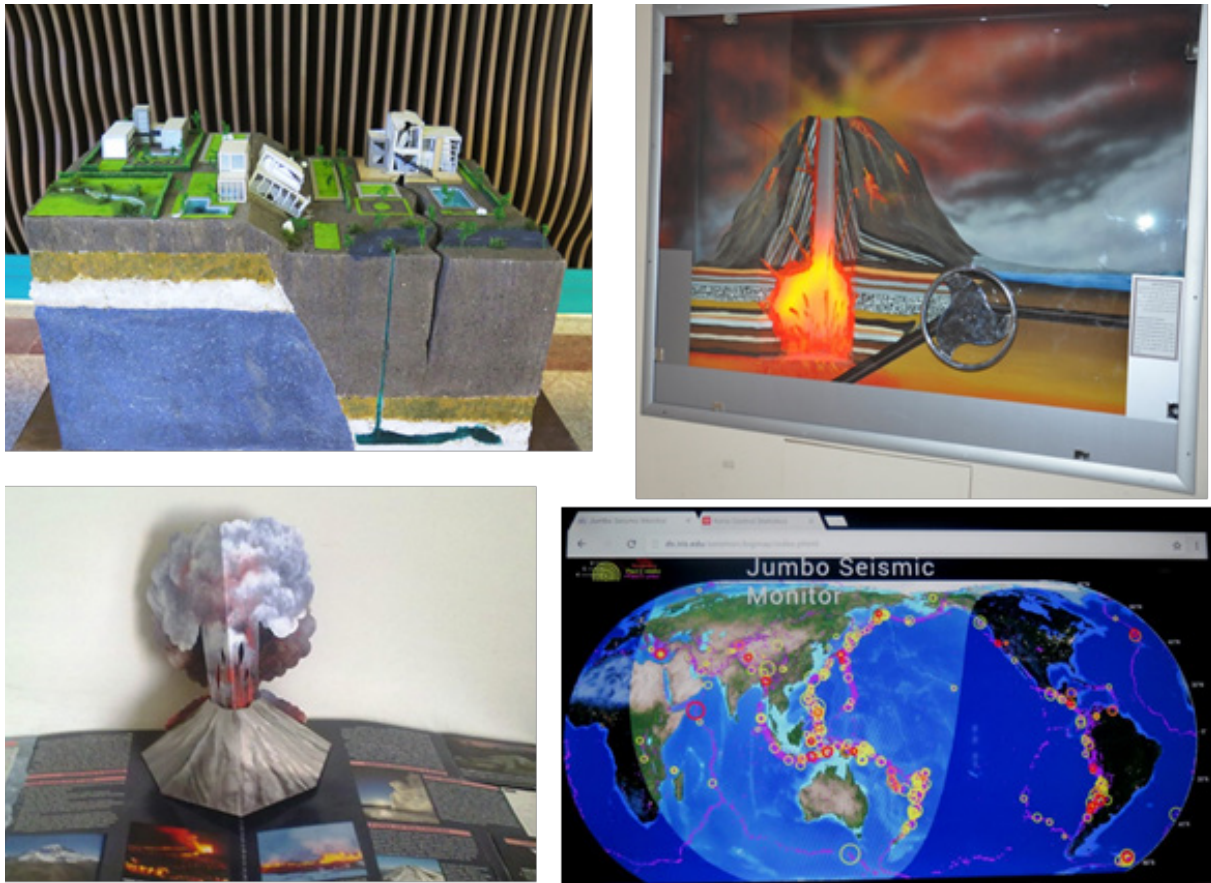


Figure 3 - Some methods of introducing geological phenomena and hazards in GMM

1.3 Participation

The third step is to encourage cooperation in the practical protection of the environment. Since education should start at an early age, we had targeted programs with school children. For example, with the participation of museum representatives in the student's classroom, it was explained how to form groundwater aquifers, find it, treat water, install the necessary plumbing, and finally deliver the treated water to the consumer. Then the ways of optimal use of urban treated water and the need to avoid wasting it were discussed in class about the benefits of using cloth bags instead of plastic bags, keeping nature clean and not leaving garbage on the streets and promenades was also talked. Following these conversations, which often took place with the participation of children, we asked them to express their conclusions from these discussions with their drawings. We hoped that by doing this, we would be able to influence the student's minds and, as a result, their performance. In addition, we kept the students' beautiful paintings for future exhibitions (fig. 4).



Figure 4 - Group work with students and their parents

Of course, there have been other group programs, such as garbage collection from parks and promenades, and training and emphasis on the separation of dry and wet waste. Such programs are especially emphasized on special occasions such as World Earth Day. These seem to be simple things, but they are necessary for a normal and healthy social life. We go step by step to bigger and more serious issues.

You noticed that I used the past tense because most of these programs ended with the beginning of the Corona virus pandemic and starting the online classes. We hope museums will be activated and the enthusiasm will return to our museum when the pandemic is over, and we will be able to fulfill the tasks and goals we have set for ourselves.

Conclusion

Museums, especially science museums, can be a factor in encouraging cultural progress and achieving the aspirations of nations. Regardless of political conflicts, museums can receive citizens' opinions on issues related to each area and create paths for free and logical discussion, and ultimately convey these opinions to the authorities. Raising people's knowledge and awareness will lead to demanding. Demanding societies are forcing governments to make better decisions. Therefore, in the GMM, we try to raise questions in the minds

of visitors, who are mostly teenagers and young people, by raising general knowledge and describing geological phenomena. In different galleries of the museum, geological phenomena and hazards are introduced and the reason for their occurrence is explained with the help of replicas, films and teaching aids. In this way, we encourage them to better understand the current state of the earth by searching and discovering the past, to establish a better connection with the dynamic planet we are living on, and to see the pros and cons of the good and bad things we do.

Acknowledgment

This article describes the efforts and experiences of my colleagues in GMM, especially Maryam Hosseiniyoon. I appreciate all their efforts. I would also like to thank Saharnaz Tajbakhsh for her helpful comments and cooperation.

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- Iranian Self-taught Artists Association

11- "Self-learning in the mirror of nature" ICOM Members, Founder of Self- Learning

Pardis Ezati - Parnian Ezati

Iranian Self-taught Artists Association was founded on February 2007 ,9, to identify and introduce artists who have not received any academic training in art and have created astonishing artworks without an instructor, and have consistently amazed and surprised everyone. Self-taught artists have a long history as old as human life itself, where there is no pattern for creating works of art and when artists have followed their imaginary patterns and elements and have produced and presented works of art outside the academic system, which is the result of their innate creativity. From the late nineteenth century to the second half of the twentieth century, these artists have been introduced under different titles, examples of which follows below: Primitive art Art brut Naive art, naïve art Folk art Outsider art Children art The significant point is that today the world of art does not look down on self-taught artists, as it did in the past; on the contrary, it is inspired by self-taught artists' art, in a way that museums across the world place the works of other arts next to the artworks of self-taught artists. With their innate creativity, they have spoken in the most possible abstract way of the oldest human origins in history, sometimes with images, sometimes words, and sometimes by making sculptures. It is worth noting that the role and the association here is as follows, to create courage, to provide opportunities, to create opportunities, even to



develop the human imagination and creativity, which self-taught artists have narrated in their simple language that directly signifies man and his ideals. Association Charter 1) Discovering the essence of people's creativity 2) Introducing this creative essence to the world 3) Preserving and preserving this innate creativity and creative essence for the future. To acquaint everyone with the self-teaching genre, the association has compiled a book called Manifesto, which currently is being translated to five world languages: Spanish, French, German, Arabic, and English, to enlighten and introduce its alphabet and then the gloomy name of this genre. *Iranian Self-taught Artists Association* The creator of the first movement of the self-teaching genre in the world, which represents the unique monuments in the world regardless of race, color and culture, ethnicity, nationality, and religion, and their genuine origin is the protection of the true essence of human creativity that are in an inseparable bond with their relatives, an accurate mirror of the evoked history, and step by step built the palace of the culture of the ancient lands. The association has organized five national festivals in Iran and in more than forty groups and individual exhibitions during these years to identify and introduce self-taught artists, in addition to protecting tangible human heritage; the main activity of the association during these years being to protect the intangible human heritage and to heal the existing historical and cultural vacuum, which is the sign of human nature and life.

Ms. SHAKHANOM MORADI was born in the "Hoozmanan" Nomads in South of Kermanshah County in 1958. In 1975, she moved to Kermanshah City with her family due to the difficulties of seasonal migration, advancements in technology, and some other reasons including the educational progress of kids.

Having benefited from the gifts of migration, local knowledge of the elders in the tribe, and the beautiful nature of Zagros region during her lifetime, SHAKHANOM started missing her hometown. After this feeling of isolation and loneliness, she decided to reread, rehabilitate, and represent some parts of her nomad culture, relying on her strong will and the local knowledge and art hidden in her heart and hands. That was why she started making nomad dolls, which were extinct more than 40 years ago. According to SHAKHANOM and other nomads, the cultural background of some of these dolls dates back to the ancient festivals of "Tamanye Baran" literally meaning "wishing for the rain". The ceaseless efforts of SHAKHANOM has resulted in creation of more than 80 nomad dolls, some in the human figure and some in domestic and wild animals' figures.

From the spring of 2013 on, in an attempt for a better introduction of some parts of nomad culture, SHAKHANOM MORADI started drawing some creative paintings of the nature, lives, stories, and festivals of nomads, with no training or assistance; this attempt resulted in drawing more than 24 paintings by the spring of 2014. During that time, she was also involved in making different types of handicrafts in sizes smaller than the real ones.

She has taught her skills of making nomad dolls and small-sized handicrafts to other women in her area too. Among other purposes of SHAKHANOM and her family, we can mention her aids for the reproduction of her hometown nature. She hopes she could help vitalize and revitalize the oak trees through



attributing some parts of her and her students' income gained from the sales of their achievements.

In Ordibehesht 1393 (April-May 2014), in the exhibits of cultural heritage week and the international days for biological and cultural diversity, the International Council of Museums of Iran (ICOM) welcomed the cultural and artistic achievements of Ms. SHAKHANOM MORADI and also her student, Ms. DARYA MIRZAEI, in an attempt to support the plan "sustainable local support and preservation of art, culture, and nature of Kermanshah through empowerment of local women". The works of this artist (Ms. MORADI) have been displayed in more than 10 art exhibitions including those held in Niavaran Palace, Iranian Artists Forum, National Museum of Iran, Tehran Museum of Contemporary Art, Golestan Palace, Golestan Cultural Center, Bahman Cultural Center, and Arasbaran Cultural Center.

KANIZ ABBAS PANAH, 68, living in Hormoz Island, has got married for three times and is the mother of 13 children. KANIZ and her mother both were married at the age of 7. At that young age she would serve as the maidservant of the other two wives of her husband. She leaves no stone unturned to make a living. She, beside some other women, is even involved in the job of fish drying for the fertilizer factories. She has always smiled at the endless miseries of her life. She has reflected a different interpretation of her time in her unique and amazing paintings. She has participated in group exhibitions of Iranian Artists Forum for Self-trained Artists Society of Iran alongside Dr. AHMAD NADEALIAN since 2013 and her works have been displayed there.

12- ICOM IRAN Conservation Commission and Protection Guidelines for the Museums during Coronavirus Pandemic

Dr. Parisa Abdollahi

ICOM CC

Abstract

ICOM IRAN Conservation Commission, consisting of twelve specialized working groups, began its activities in the summer of 2017. With the spread of Coronavirus pandemic, the Commission's undertakings not only were not limited but continued virtually. One major endeavor of the Commission during the Coronavirus pandemic was the preparation of a protocol as the "Recommendation, General Requirements, Hygienic and Technical Principles for Re-opening of Museums during Coronavirus Pandemic" in the summer of 2020. This document has considered the two factors of human life and human heritage, concurrently and with greater sensitivity than before, and in this respect it may be considered, in its form and content, exceptional. Environmental characteristics that are recommended and implemented to protect human health may not



necessarily be in same line with the conservation requirements of cultural heritage. Museum environment and regulations have always been defined and implemented in such a way that priorities are mostly given to the museum objects. But with the dominance of such a dangerous disease, which has endangered the lives of thousands of people around the world since its inception, new changes and modifications are needed, that may endanger the well-being of museum artifacts in exchange for the safety of the visitors, which, in its turn, is in conflict with the principles of heritage conservation.

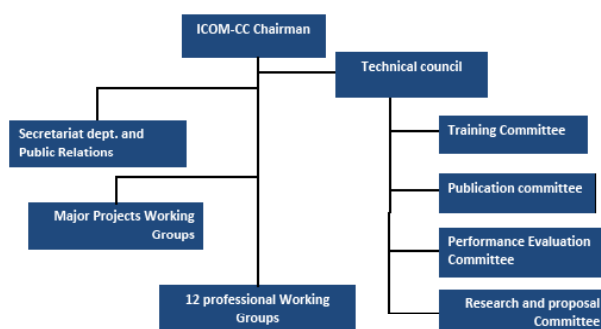
In this document, prepared and formulated through collecting field data, and with cooperation of experts from various fields of conservation and restoration, and curators, as well as available international scientific sources, attempts are made to meet the requirements of two subjects; that is the conservation and preservation of cultural properties as well as general requirements, hygienic and technical principles both based on the significance of human life and cultural heritage. In this way, this document, along with other national and international texts, might help with the re-opening of the museums and historical and cultural sites, and in other words, could make the re-connection of people with their respected cultural heritage, an essential precondition for the conservation and preservation of the world heritage.

Keywords: ICOM IRAN Conservation Commission, museum, Coronavirus pandemic

This presentation consists of three major parts, including: ICOM-CC IRAN before Coronavirus pandemic; which is actually a short introduction of this commission; ICOM-CC IRAN during the Coronavirus pandemic; and The Recommendations and General Requirements of museums during Coronavirus Pandemic

1- ICOM-CC IRAN before Coronavirus pandemic

ICOM IRAN Conservation Commission, as one of the scientific groups of Iran International Council of Museums, was formed in the summer 2017. This group currently consists of different parts as is demonstrated in this organizational chart:



The twelve Specialized Conservation working groups are as:
 -Conservation of Manuscripts and Archival Materials



- Conservation of Paintings
- Earthen Architecture Traditional Techniques and Building Materials
- Conservation of Architectural Decorations
- Conservation of Metal and Enamel
- Conservation of Stone and Rock Arts
- Conservation of Carpets and Textiles
- Conservation of Archaeological finds
- Conservation of Modern Materials and Contemporary Art
- Training and Preventive Conservation
- Conservation and Restoration History and Theories
- Documentation

Until the early winter of 2019, and before the outbreak of the COVID-19 virus, the Commission carried out several activities including holding consulting and professional meetings, and also scientific lectures in various museums.

Scientific Lectures

The Commission also published five editions of its quarterly Journal from the Autumn of 2017 to the Spring of 2019.





2- ICOM-CC IRAN during the Coronavirus pandemic

66 Virtual Scientific Lectures

Since the winter of 2019 and during the Coronavirus pandemic, these activities neither stopped nor limited, but continued virtually. During this period, the Commission has held 66 live virtual scientific lectures and round table and meetings so far through ICOM-CC IRAN official Instagram page



55 Publications

The group also published 55 volumes of Journals including 3 special volumes on special occasions (Nowruz 2019; The Week of Research 2020; and the Week of Cultural Heritage 2021). The other 52 Journals belonged to the 12 Working Groups of ICOM CC Iran as mentioned earlier.



3-The Recommendations and General Requirements of museums during Coronavirus Pandemic

With the outbreak of coronavirus pandemic, various institutions at the national and international levels such as ICOM and American Alliance Museum began to develop guidelines to protect museum visitors against this dangerous disease. ICOM-CC Iran following its duties; and upon the appeal of the Cultural Heritage and Tourism Research Center; and ICOM Iran National Committee, began to prepare this protocol through collecting field data, cooperation of the experts from various fields of conservation and restoration, curators as well benefitting from available information worldwide. The final draft of the Protocol, in two languages (Persian and English), was circulated in all the museums and other relevant institutions in Iran, also submitted to ICOM, and ICCROM.



The Effects of Coronavirus Pandemic on Conservation of Cultural Properties

The closure of the museums for several months and their re-opening would cause changes in the environmental conditions of the works of art within the museum, a point which should not be overlooked. In addition, the control of this pandemic in order to protect the health of the people requires new approaches and therefore implementing changes in the environmental conditions of museum spaces. Environmental characteristics that are recommended and implemented to protect human health may not necessarily be in same line with the conservation requirements of cultural heritage. Museum environment and regulations have always been defined and implemented in such a way that priorities are mostly given to the museum objects. But with the dominance of such a dangerous disease, which has endangered the lives of thousands of people around the world since its inception, new changes and modifications are needed, that may endanger the well-being of museum artifacts in exchange for the safety of the



visitors, which, in its turn, is in conflict with the principles of heritage conservation. In most of the international recommendations, the main focus have been on the health of visitors. However, what distinguishes our recommendations from other available ones then, at the outset of the pandemic, was its concentration on the museum collections, as well as the visitors and museum staffs, that is to say not focusing mainly on the safety of the visitors.

Therefore, three groups were targeted in our protocol: Visitors; Museum staffs; and Museum collections.

It is known that In risk management plan for museum collections, five steps are introduced to reduce the risks, including: avoid (Avoiding any source of contamination to enter the museum space) , block (Applying protective barriers to avoid the risk of contamination), monitor (Assessing objects condition and collections care), respond (Implementing measures to control contamination risk), and recover (that is Emergency operations in case of crisis). Considering that the proposed methods for controlling the coronavirus and reducing its destructive effects on humans can also be indirectly dangerous to the cultural properties, the five so called protective levels are used and considered in this protocol as well.

Health and Safety Guidelines during Coronavirus Pandemic

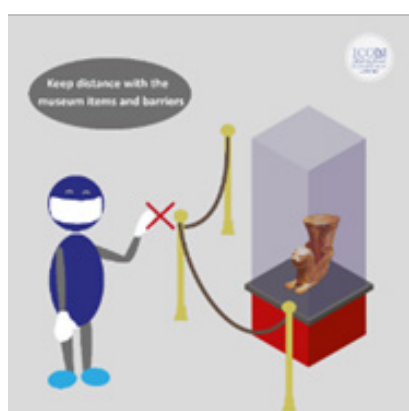
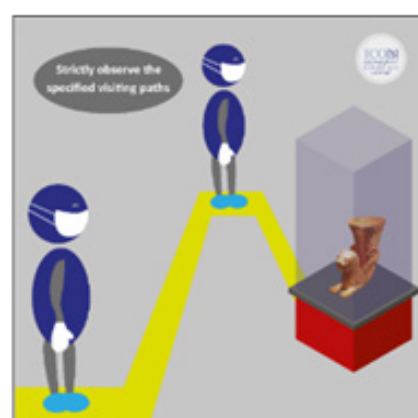
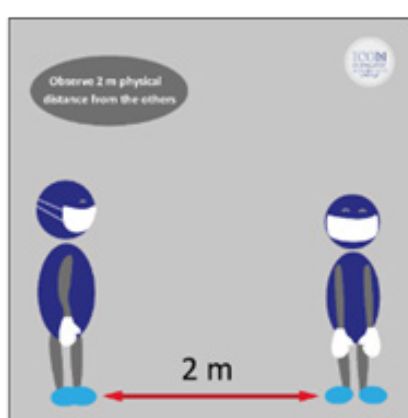
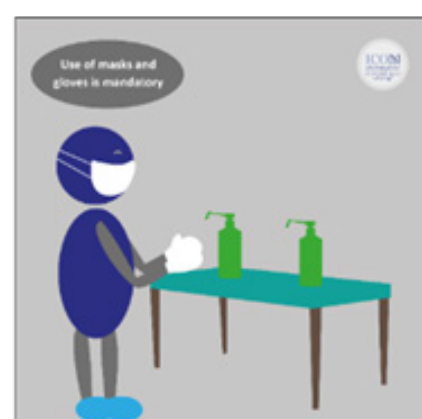
According to the target groups mentioned, this protocol submits 5 separate guidelines for visitors; museum staffs and guides; conservators and restorers; curators and trustees; and a guideline for cleaning and disinfection of the surfaces. Which is available in ICOM-CC Iran website, and also you can find it posted on ICCROM's website.

The recommendation is followed by Annexes comprising of 3 Tables regarding: various damages caused by relative humidity, temperature and pollutants and the recommended preventive measures for each part; evidences of deterioration due to inappropriate temperature and/or relative humidity in different types of materials; and also the types of museum objects requiring specific RH conditions.

Guiding Signs

At the end of the protocol you can find the 10 guiding Signs for the visitors.





Infographic posters

Four posters were designed for: General requirements and Hygienic principles to visit Museum and collections; Archives and libraries; Site museums and Historic areas; and Historic buildings, during Coronavirus Pandemic.



Conclusion

- It seems quite likely that Coronavirus will stay with us for some time, if not years to come. Consequently we will have to adopt as it develops; that is to say that in museums and historic places we have to accommodate ourselves with the developments and alterations of this pandemic
- For this reason ICOM Iran Conservation Commission intends to expand its activities in Education/Training and Publications domains for the next two years; most of these programs not only will address technical issues but also the pandemic situation
- We shall therefore try to cooperate more closely with the countries of the region in controlling the pandemic, as it is not a national problem but an international one, as well as promoting conservation/restoration issues;
- Planning to organize four regional seminars/workshops in 2022 for the same purposes;
- And finally these protocol guidelines need to be revised internationally and nationally according to the requirements of the time. We shall follow this point too.

13- Biological Control of Box Tree Moth, *Cydalima perspectalis*, in Hyrcanian Forests

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Abstract

Box Tree Moth (BTM), *Cydalima perspectalis* (Walker) (Lep Crambidae) was first reported about 4 years ago from Iran. Since then, it has seriously damaged hyrcanian box trees in the north forests of the country. To control the pest larvae, some urgent measures including application of Bt, botanicals and IGR products have been practiced, however, results are not satisfactory. Reasons included irregular distribution of box trees in the area, limitation of access to highlands and equipment and labor scarcity. After finding the preliminary affirmative lab results of native egg and larval parasitoids activity on the pest, a study was carried out on its biocontrol program. The selected parasitoids were mass produced in Amol Biocontrol Research lab. Releases were made based on the pest life stages and population status. Preliminary results revealed that released natural enemies were able to locate and parasitize the pest. In average,



multiple releases of *Trichogramma* sp. resulted in 63.6 and 42.80 percent parasitism of the pest eggs. Similarly, 23.07 and 9.09 percent larval parasitism occurred after 1st and 2nd releases of *Habrobracon* herbator, respectively. Considering the results obtained in the current study, biological control of *C. perspectalis* certainly is the only solution to ensure the integrity and solidarity of the hyrcanian forests environment.

Keywords: biocontrol, parasitoids, invasive pests

1. Introduction

Hyrcanian forests harbor the oldest tree species including box tree, *Buxus hyrcana*, in the north provinces of Iran. A recent invasion by *Cydalima perspectalis* has endangered the 6000 years old forest (Ahangaran, 2016). The pest spread rapidly and it is now active wherever box trees are located. In the growing season the out broken pest population defoliate box trees and later generations may feed on barks. Due to comparatively slow growth rate of box trees, they are apt to death (Fig. 1).

Box tree moth is native to Southeast Asian countries where there are several natural enemies regulating its population including *Chelonus tabonus* with more than %50 parasitism (Wan et al., 2014). The pest entered Europe around 2007 probably by imported goods from Asia (Billen, 2007). Since then, it has covered most parts of Europe (Göttig, 2017) and has exposed the boxwood species to great risks (EPPO, 2016). Canadian Food Inspection Agency (CFIA) has confirmed *C. perspectalis* presence in Toronto, Ontario, as its first detection in North America in 2018 (CFIA, 2020).

The speed of pest dispersal implied that there was no effective natural enemy to limit its population growth. Although *Compsilura concinnata* (Meigen) was reported as a parasitoid of *C. perspectalis* (Farahani et al., 2018), there was nodemographic data and parasitism rate available for a scientific evaluation of its biological control potential against the pest. Therefore, it was necessary to search for effective natural enemies through intensive demographic and predation/parasitism research. Based on literature review *Trichogramma* sp., *Chelonus tabonus* and some entomopathogenic nematodes, fungi and Bt have been effective on different pest stages (Wan et al., 2014). Therefore, several populations of an egg and a larval parasitoids were screened and experiments proved that some species of *Trichogramma* spp. and *Habrobracon hebetor* were able to successfully accept and parasitize eggs and larval stages of the pest, respectively (Shirazi et al., 2019). Therefore, a complementary investigation was taken up to evaluate the effectiveness of the selected biocontrol agents on the pest management in an infested location of hyrcanian forests in Mazandran province.



2. Material and Methods

2.1. Host Rearing

Larvae and eggs of *C. perspectalis* were collected from infested trees and taken to the lab. A colony of the pest was established on the fresh leaves of boxwood at $^{\circ}\text{C } 1 \pm 25$ $\%10 \pm 50$ RH and 16:8 L:D photoperiod (Fig. 2).



Figure 2 - Rearing method of *Cydalima*

2.2. Egg Parasitoid

2.2.1 Collection of Parasitoids

Specimens of the egg parasitoids were collected from infested box trees and other plants by sampling insect eggs. Emerged parasitoids were reared on the eggs of Angoumois grain moth, *Sitotroga cerealella* (lab host), and were later identified as *Trichogramma* spp. Colonies were maintained at $\%10 \pm 50$ $^{\circ}\text{C } 1 \pm 25$ RH and 16:8 L:D photoperiod.



2.2.2.

Screening Experiments

Trichogramma specimens were exposed to *C. perspectalis* eggs on the box tree leaves at a distance of 4 m at semi-field conditions. Those which were able to locate the host eggs and parasitize them within 24 h were considered as superior strains. Furthermore, by complementary studies one strain was selected for field evaluation.

2.2.3. Mass Production and Packing

The selected strain was mass produced on the eggs of lab host at above mentioned conditions. About 700-500 parasitized host eggs were glued on a trichocard and considered as a unit of release.



2.2.3. Release Programs

Releases were programmed based on the pest status evaluation in a half h boxwood plantation in Mazandaran province. Therefore, by regular examination of leaves on 20 samples of box wood branches with ~30 cm length at field and lab, the dominant pest stage was determined. Upon pest egg laying phase, the release was accomplished by hanging 3-2 trichocards on each infested tree. Depending on the length of pest oviposition, more releases were made with ~3 days intervals.

2.2.4. Program evaluation

Pest eggs collected during regular sampling as mention above, were reared at $10 \pm 5^\circ\text{C}$, 1 ± 25 RH and 16:8 L:D photoperiod in order to calculate the percent parasitism due to the release programs (proportion of parasitized egg batches to the total recovered egg batches).

2.3. Larval Parasitoid

2.3.1. Parasitoid Selection

A prevailed population of *Habrobracon hebetor* was selected as larval ectoparasitoid. The wasp was reared on larvae of Mediterranean flour moth, *Ephestia kuehniella*, at the above mentioned conditions.

2.3.2. Packing and Release

H. bracon adults were packed in test tubes and were released at the rate of 3-2 thousand adult wasps per 5000 m² of the experimental forest pilot.

2.3.2. Evaluation of the Program

The effectiveness of *H. hebetor* releases was evaluated by the same method explained above, however, here number of and status of larvae were taken into account per samples. The efficiency of the parasitoid was the proportion of paralyzed and parasitized larvae to the total counts.

2.4. Statistical Methods

All data were arranged in excel sheets. Simple average formula was employed for parasitism rate calculation.

3. Results

Investigations revealed that *C. perspectalis* overwinters in larval stages. Larvae restart their feeding in mid of March. Adult moths appear late in April to early in May. Female moths lay their eggs in batches of 50-10 eggs usually on the lower surface of box tree leaves. At $10 \pm 5^\circ\text{C}$, 1 ± 25 RH and 16:8 L:D photoperiod, its egg incubation, 6 larval instars and pupal stage development takes 28, 7 and 9.5 days, respectively (Fig. 3).

The sampling on the pest status started late in Feb, 2021 and the activity of



its overwintering larvae was recorded in mid days of March. The first batches of *C. perspectalis* eggs were observed on April, 20, in Razakeh, Amol County. Therefore, first released of *Trichogramma* sp. was carried out 5 days later (Tab. 1). In case of rainy weather, trichocard units were kept in plastic vials with net cloth on their opening to ensure the sound emergence of the parasitoids at field condition upon release.

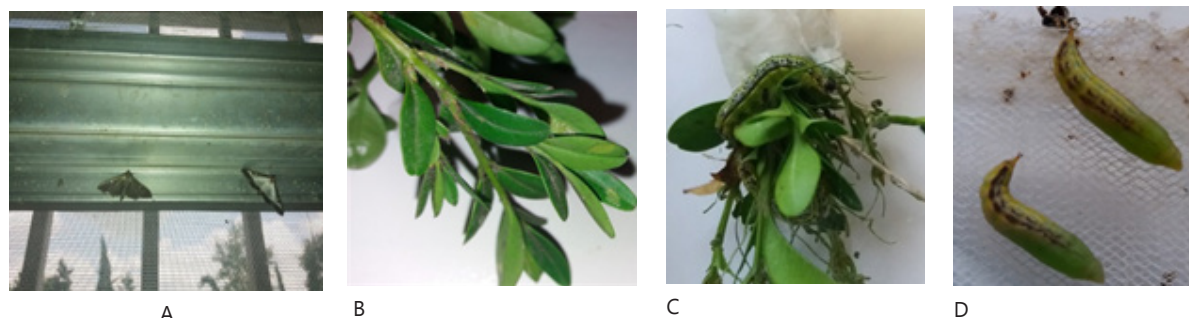


Figure 3 - *Cydalima perspectalis* life stages: adult moths (A), egg batches (B), larva (C) and pupa (D).
Source: Original

#	Date	Pest Status	Species Released	Unit
1	Feb, 25	overwintering larvae	-	-
2	March, 2	overwintering larvae	-	-
3	March, 15	overwintering larvae	-	-
4	March, 25	active larvae	-	-
5	April, 5	active larvae	-	-
6	April, 20	Egg	-	-
7	April, 25	Egg	<i>Trichogramma</i>	500 trichocards
8	April 28	Egg, 2 nd instar larvae	<i>Trichogramma</i>	700 trichocards
9	April 28	Egg, 3 rd instar larvae	<i>Heliothis</i>	2000 adults
10	May, 15	Pupa	-	-
11	May, 30	Egg	-	-
12	June, 4	Egg	<i>Trichogramma</i>	750 trichocards
13	June, 6	Egg	<i>Trichogramma</i>	750 trichocards
14	June, 8	Egg, 2 nd instar larvae	<i>Trichogramma</i>	100 trichocards
15	June, 8	Egg, 3 rd instar larvae	<i>Heliothis</i>	2500 adults



16	June, 22	Egg	<i>Trichogramma</i>	1500 trichocards
17	July, 1	Egg	<i>Trichogramma</i>	700 trichocards
18	July, 6	Egg, larvae	<i>Trichogramma</i>	550 trichocards
19	July, 20	Egg, larvae	<i>Trichogramma</i>	700 trichocards

Table 1: *Cydalima perspectalis* status in Razakeh area, Amol County, Mazandaran province and biocontrol agents releases data.



Figure 4 - Parasitized eggs of *Cydalima perspectalis* by *Trichogramma* sp.

Source: Original

Data of the first after-release-evaluation (ARE) proved a parasitism rate of %63.6 parasitism of the pest egg batches (Fig. 4 and 5). On the other hand, out of 22 egg batches recovered, 2, 4 and 14 batches were egg shell, healthy eggs and parasitized, respectively. Despite of heavy pest egg batches observed late in May and early in June, the second ARE revealed %42.8 parasitism rate. It coincided with high damage of the pest to boxwood leaves, thereby a few egg batches were recovered (Fig. 5).

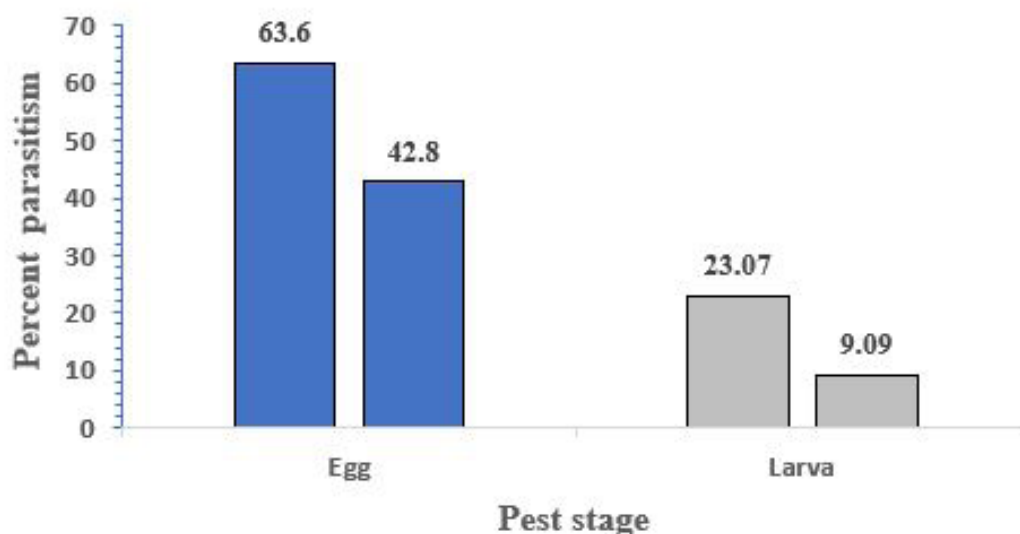
Similarly, larval sampling demonstrated that %23.07 of the pest larvae were attacked by *H. hebetor* following the first release (Fig. 4). Further evaluations proved that with increase in pest population the pest larval parasitism declined to almost %10 in average (Fig. 5). During sampling some larvae were collected with disease symptoms. They were sent to insect pathologists for further investigation.

Figure 5: Percent parasitism of egg and larval stages of *Cydalima perspectalis* after multiple releases of *Trichogramma* sp. and *Habrobracon hebetor*.

4. Discussion

Although *C. tabonus* is a pivotal parasitoid declining *C. perspectalis* population in Southeast Asian forests, there are a number of other natural enemies attacking





the pest including 3 species of tachinid flies, 7 species of parasitoid wasps and 2 species of predators (Wan et al., 2014).

When the pest invaded European countries, a lot of efforts were invested on its neoclassical biocontrol. Goettig and Hertz (2016) evaluated 8 species of *Trichogramma* spp. amongst which *T. dendrolimi* had %40 parasitism on the pest eggs. In average we obtained ~%53 egg parasitism by multiple release of *Trichogramma* sp. which supports Goettig & Hertz (2016) results. There are a number of studies demonstrating the effectiveness of *Trichogramma* species on a wide range of agricultural and forest pests (Herts, 2013, Albert et al., 2008). Farmers in Germany were able to reduce *C. perspectalis* pressure on their nurseries by releasing *Trichogramma* commercial products (Albert et al., 2008). A very recent research revealed that the application of *Trichogramma* spp. on spruce budworm increased egg parasitism regardless of pest egg densities (Martel et al., 2021), nevertheless, our observations verify that as *C. perspectalis* egg densities increased the rate of parasitism decreased which is at odd with Martel et al (2021) findings who reported no significant correlation between the egg parasitism and density in their experiments.

Weak but promising results obtained by *H. hebetor* releases may shed light on the employment of larval parasitoids against boxwood moth. Lab experiments have already proved the limitation of braconid wasps in developing on the larvae of *C. perspectalis* (Shirazi et al., 2019; Zimmermann and Wührer, 2010), however, Temerak (1983) drew attention toward the complex process in host acceptance and preference of *Bracon brevicornis*, a close species to *H. hebetor*.



Previous studies reported over %90 parasitism of *C. perspectalis* larvae at lab conditions (Shirazi et al., 2019), nevertheless, in the present field study an average rate of %16.08 larval parasitism was obtained by two releases of the wasp which is almost one third of that for *C. tabonus* (>%50) reported by Wan et al. (2014) in the native habitat of the pest.

In general, invasive species pose several disadvantages to their new habitat including competition with native species for resources, transferring new diseases, interfering with pollinators etc. Moreover some invasive insects, particularly forest herbivores are known to affect ecosystem processes through cascading effects (Kenis et al., 2009). It is known that in a forest ecosystem there are numerous factors functioning to bring about sustainability. In particular, hyrcanian forests harbor an array of plant and animal species closely related and affecting each other in one way or another. A recent study revealed that the life of over 550 species of birds is depended to hyrcanian forests (Khaleghizadeh et al. 2017). In such complex medium any manipulation may cause a tragic environmental issue.

Considering the results obtained in the current study and important points mentioned above, biological control of *C. perspectalis* certainly is the main solution to ensure the integrity and solidarity of the hyrcanian forests environment. Furthermore, this strategy provide an opportunity for other domestic natural enemies to seize their share actively, a familiar scenario occurred when *Tuta absoluta* invaded agricultural ecosystems in Iran. Finally, multidisciplinary approaches and skills are required to deal with an exotic species invasion in forests.

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14- People and National Botanical Garden of Iran

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Abstract

Botanical gardens are living collection of plants set aside for the purposes of ecological study, adaptability programs, conservation of endangered species, education and promote environmental awareness. Design and construction work of National Botanical Garden of Iran was began in 1968 in an area of 145 ha located on the southern slopes of Alborz mountains, Northwest of Tehran, so far, the garden maintains, over 20 plant collections comprising 4,000 native and exotic species. National herbarium of Iran with more than 150,000 specimens, the palaeobotanical collection with more than 1100 samples of plant fossils and wood fossils, natural resources gene bank of Iran with 47,000 accessions from 4000 wild plant and insect museum with about 200 unique and rare species from all over the world are the other parts of the NBGI. Every day a large number of people, especially students, researchers, and the general public visit these collections. Therefore, the role of the NBGI in promoting public awareness and education is very important.

Keywords: Education, conservation, museum, National Botanical Garden of Iran.

Botanical gardens

Botanical gardens are living collection of plants set aside for the purposes of ecological study, adaptability programmes, conservation of endangered species, education and promote environmental awareness. Through a carefully concerned plan to provide harmony with environment, the gardens try to develop and maintain public concern (consciousness) towards the high values of natural resources, environmental heritage and sustainable living.

National Botanical Garden of Iran

Design and construction work was begun in 1968 in an area of 145 ha located on the southern slopes of Alborz Mountains, Northwest of Tehran. So far, the garden maintains, over 20 plant collections comprising 4000 indigenous and exotic species as well as vast specialized taxonomic collections. Altitude of the area is 1320 m and the climate is dry and cold with an average annual precipitation of 230 mm. Maximum and minimum, temperature is 43+ °c and 15- in July and Jan., respectively. Soil type is light sand-loam with high permeability. Six lakes have been excavated, and filled with water. Two hills (the highest reaching 19 m),



have been built up to represent the Alborz and Zagros mountains, (the largest mountain chains of Iran). A large rock garden with cliff walls and a waterfall has been completed as well as a special section for Iranian bulbous plants. Also another cliff wall with waterfall has been built up in Alborz section. Furthermore a wetland area has been designed and cultivated in this section (Fig. 1).

The National Botanical Garden of Iran activities are as follows: developing living collections, conservation of native plants biodiversity, and research on horticultural aspects, establishment and phenology of plants, education and public awareness, workshops and students educational programs.



Fig 1 - Map of the National Botanical Garden of Iran

The collections of National Botanical Garden of Iran

There are three 3 kind of collection in the garden including: Native, Exotic and General Habitat (Fig. 2).

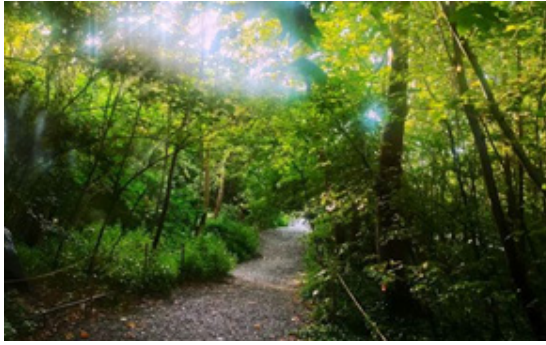
Native habitats collections included: Hyrcanian Forests; Zagros Forests; Southern Alborz habitat; Irano-Turanian desert habitat; Southern Iran greenhouse; Persian bulb garden; Persian fruits garden.

Exotic collections included: Chines and Japanese Garden; Europe habitat; Caucasus habitat; American meadows; Himalaya habitat.

General collections included: Arboretum; Systematic garden; Medicinal plants garden; horticultural display area; Rock gardens; Forest and walkway; broad leaf evergreens; Chrysanthemum collection; Educational display plots; Nursery and Cactus greenhouse.

Every day a large number of people, especially students, researchers, experts, investigators and the general public visit these collections (Fig. 3).





Hyrcanian Forests



Alborz habitat



American meadows



Europe habitat



Zagros Forests



Chrysanthemum collection

Fig 2 - Some pictures of different habitats of National Botanical Garden of Iran

Herbarium of Iranian plants (TARI)

The National Botanical Garden of Iran is planned to be the main center for horticulture and plant taxonomy in Iran. A herbarium of Iranian plants (TARI) is gradually being built up and now consists of some 150,000 specimens. This herbarium is the largest herbarium in Iran.



Fig 3 - Foreign visitors of garden



Iran with special geographical situation, climatic and topographical features has one of the richest floras consisting of spermatophytes and pteridophytes. The determination of plant species and biodiversity, also management of natural resources is impossible without exact knowledge of plants.

The goals of the Central Herbarium of Iran includes: development of the herbarium by collecting more materials from Iran or possibly neighboring countries, continuation of the publication of the flora of Iran, doing taxonomic, biosystematics and phylogenetic researches on the plants of Iran and their relatives, defining the conservation status of native plant species and plant geobotanical studies (Fig. 4).



Fig 4 - Central Herbarium of Iran and shelves

Natural Resources Gene Bank of Iran

In the flora of Iran, there are approximately 8000 plant species, from which about 2000 species are endemics. Due to human activities and climate change a considerable number of plant species are threatened, so in need of conservation. Iran's Natural Resources Gene Bank aims to conserve native plant species seeds with a focus on endemics, species most at risk and most useful for the future. Iran's Natural Resources Gene Bank, was founded in 1994, is located at RIFR and is providing space to store thousands of seed samples in large underground cold rooms. Iran's Natural Resources Gene Bank includes advanced seed research and processing facilities. The public can watch films on seed research and conservation in action in the laboratories. The objectives of this collection are: Identification and monitoring of plant genetic diversity, collection of wild plant germplasm, conservation of wild plant species, regeneration of seed accessions, evaluation of seed accessions, utilization and exploitation of wild plant resources, and plant germplasm exchange.

We have already successfully saved seeds from over %50 of the Iran's wild plant species. Our aim is to secure the safe storage of seed from %100 of the Iran's bankable plants. The seeds we save are banked at Iran's Natural Resources Gene

Bank. We preserve seeds of plants species collected from all provinces of Iran. The seeds are dried, cleaned and stored in sealed aluminum cases at °4+C and °20-C in the cold rooms of gene bank. The Natural Resources Gene Bank holds more living plant diversity per square meter than anywhere on Iran and Middle East. The unit has 6 storage modules/cooling room to store the seed collection. Currently seed conservation unit has conserved approximately 47,000 accessions of plant genetic resources of about 4,000 wild species (Fig. 5).

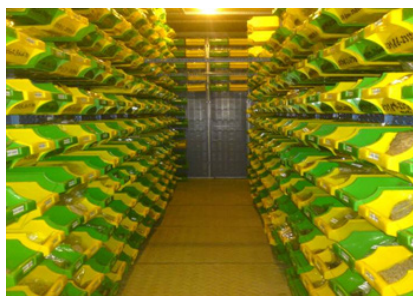


Fig 5 - Seed storage of Natural Resources Gene Bank

Palaeobotanical collection

Paleobotany is the knowledge of study of plant residues (stem, leaf, wood, etc.) and identification of different species of plant macrofossils in past geological periods and analysis of paleoenvironment. Palynology, scientific discipline concerned with the study of plant pollen, spores, fungal and algal spores and certain microscopic planktonic organisms, in both living and fossil forms. Overall, botanical macrofossil data provide a valuable complement to miospores and faunal data that can be used to reconstruct the prehistoric terrestrial environment. To preserving the plant macro and microfossils in Research Institute of Forests and Rangelands, the paleobotanical museum (Fig. 6) has been opened since 2019 which has got two main divisions:

- Museum storage cabinets (categorized fossil plants based on plants divisions).
- Samples of Iranian Mesozoic wood fossils and plant macrofossils exhibited in the showcases.

The palaeobotanical collection has more than 1100 samples of plant fossils and wood fossils. The fossils are typically found in Mesozoic sediments in the Persian basin.



Fig 6 - Plant fossils collection and plant macrofossil



Insect Museum

Insect Museum of National Botanical Garden of Iran is one of the biggest exhibitions of insects in Iran. It comprises about 200 unique and rare species from all over the world. Most of the Iranian species have been collected by the experts of the conservation and protection department during their projects. The exotic species located in this museum are native to Southeast Asia, Africa, Europe, Russia, and South America. Visiting this museum has not only the joy of seeing beautiful insects, but also the educational aspects for kids as well. So far, more than 30,000 samples from different insect orders collected from the forest and rangelands of the country are being maintained at the museum, some of which have been identified by both domestic and foreign researchers (Fig. 7).

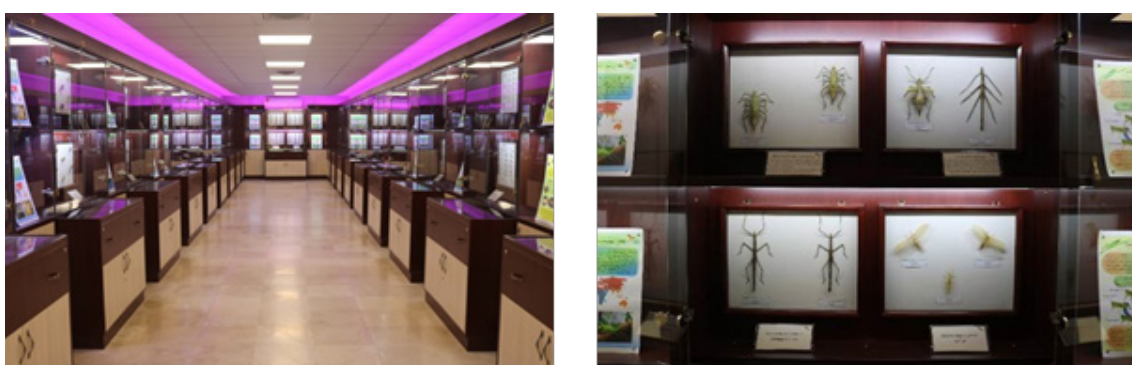


Fig 7 - Insect Museum of National Botanical Garden

Every day a large number of people, especially students, researchers, and the general public visit the National Botanical Garden of Iran and their collections. Therefore, the role of the NBGI in promoting public awareness and education is very important.

15- Sistan's Windmill, a Sustainable Technical Mechanism Based on Accurate Climate Knowledge Museum, Environment and Emergent Crises (COVID-19)

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Eastern Iran, the native country of the windmill

Historic documents about vertical windmills:

- The Arthashastra of Kautilya, 4th century B.C: "If uncultivated tracts are acquired (for cultivation) by mortgage, purchase or in any other way, remission of taxes shall be for two years. Out of crops grown by irrigation by means of wind power or bullocks or below tanks, in fields, parks, flower gardens, or in any other way, so much of the produce as would not entail hardship on the cultivators may be given to the Government (Kautilya, 244 ,2010)".
- According to Mabbett, I. W (167 ,1964), the text of Arthashastra was influential until the 12th century A.D. That is why such a report about the use of wind power is found in the Arthashastra six centuries before the invention of the wind-wheel in Sistan.

Wind and windmills in eastern Iran

- Mohammad Ibn Jarir Al-Tabari, historian (931-850 A.D.): "the second orthodox Caliph, Umar Ibn Al-Khattab, was murdered in 644 A.D. by a captured Persian technician Abu Lu'lu'a"
- Al-Mas'udi, geographer (950 A.D.): "Sistan is the land of winds and sand. There the wind drives mills and raises water from streams, whereby gardens are irrigated. There is in the world nowhere where more frequent use is made of the wind (Hill, 12 ,1994)."
- Al-Damesghi, geographer (1326-1256 A.D.): When they want to build a windmill (in Sistan), they build a high building such a Minaret or they choose a place on the top of a mountain or they choose a tower of a palace. They build a

building above of another one, the buildings in above has the mill which rotates and ponds the grains and in the lower building there is a wind-wheel which rotates with the enclosed wall. How the wind blows the wind mill spin, although only one of the rocks move.

Theories about the First watermills

- In the first type of Sistan windmill, the vertical axle that comes from below, keeps the weight of a suspended millstone and turns it, which is exactly the same system as the vertical axle watermill.
- three theories regarding the first vertical axle watermill:
- The first theory belongs to Joseph Needham (Reynolds, 14 ,1983) who noted in 1965 that certain ancient Indian texts dating from around 350 B.C. mentioned a kind of machine with wheel-pots attached.
- According to Terry S. Reynolds (14 ,1983), the next possible point of origin is the Near East, around 200 B.C. It is reported in the surviving manuscripts of the *Pneumatica* of Philo of Byzantium, a Greek technician who probably flourished in the late third or early second century B.C. But like Needham's early Indian norias, Philo's water wheels are questionable (Reynolds, 16 ,1983).
- The third theory that is credited by Hans E. Wulff (252 ,1966) mentions the report of Strabo (64 B.C. 24 A.D.) who was a Greek historian, geographer and philosopher; in his *Geography*, he reviewed the spoils which Pompey captured on conquering the last of the Mithridates. Among these was the palace at Cabeira in northern Asia Minor where a *hydraulatae* (water grinder) was located. The relevant passage reads:
- It was at Cabeira that the palace of Mithridates was built, and also the watermill [*hydraleta*] and here were the zoological gardens, and, nearby, the hunting grounds, and the mines (Strabo, 29-428 ,1928).
- If the Caberia watermill was built with the palace around 120 B.C., this passage would contain the earliest definite evidence of the use of water power.
- Reynolds adds: It is probably safe to date the watermill only back to the time that Pompey took the palace (65 B.C.) or too much later in the century when Strabo visited the area (Reynolds, 17 ,1983).
- According to Wulff, Mithridates was one of the Ashkanid emperors who called Mehrdad in Persian (Wulff, 252 ,1966). The Ashkanid dynasty ruled in Iran from 250 B.C. to 224 A.D. (Nozari, 69 ,2002). It seems that the person whose Strabo visited his palace in Asia Minor is sixth Mehrdad of the Ashkanid dynasty; he was the emperor who ruled in Asia Minor between 132 and 66 B.C. Thus Reynolds might be right in saying that Strabo visited the palace of sixth Mehrdad around 65 B.C. or later.
- Wulff also mentions that this kind of watermill arrived to China around the third and the fourth century A.D. He says that it is likely that the transfer of this technology was carried out by Iranians of the Khorasan province which were in contact with China at that time.

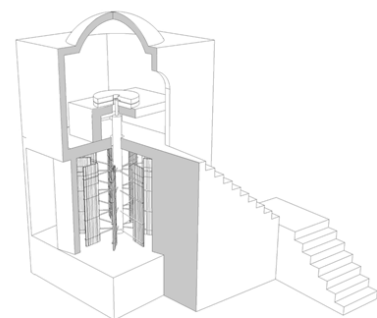


Technical mechanism of watermills in Khorasan North East of Iran

- If the knowledge of the vertical axle watermill existed in Khorasan in the first century A.D. then naturally the first type of vertical axle windmill which was based on the mechanism of the vertical axle watermill could have existed in the second or third centuries in Sistan.
- There is a question: why was the first windmill created in Sistan? The vertical axle watermill works in places where there are limited sources of water, in highlands such as Khorasan. Because of the lack of mountains and high sources of water in Sistan, people could not use vertical axle watermills. But they could benefit from a very strong stream of wind which blew four months a year, just after the season of agriculture. This climatic potential encouraged them to use the known mechanism of vertical axle watermill to create the vertical axle windmill.
- Another fact must be considered: the periods of agricultural development in eastern Iran, especially in Sistan. As we know, agricultural development between the seven and the tenth century A.D. in Europe reached a technical supremacy in the fourteenth century (White, 53 ,1980). Like in Europe, the increasing number of agricultural products created a real need for a kind of mill with a high efficiency. However, the efficiency of the vertical axle watermill was not enough (Gipe, ,1995 121). In ancient Iran, the remarkable developments in agriculture had depended on the political situation and centralized administration. The Sassanid dynasty (651-224 A.D.) was one of the pre-Islamic dynasties of Iran which created a solid domestic political system and a centralized administration (Nozari, 79 ,2002); in this period, we know that Sistan was the reserve of grain of the Empire. It seems that it was in the end of second century A.D. or in the beginning of third century A.D. that the first windmill appeared in Sistan. The wind-wheel, that is one of the main technical parts of this windmill, was also used for another purpose: irrigation.

The spread of the first type of windmill in the Islamic civilization

- The picture presented by Al-Dameshghi showing the Sistan windmill in the thirteen century A.D. mentioned four gaps, one in each of the four facades of the building of the windmill, which were used as wind entrance.
- But we know that in Sistan, wind blows only from the north. Then the windmill simply needs one gap in its northern facade like all the windmills that we can see today in this region.
- It seems that the type of windmill described by Al-Damechghi could be one of the first vertical axle windmills; it was modified in order to be able to work with local winds which blow from different directions.
- These modifications may have done somewhere outside of Sistan which



changed the architectural form of the main type of Sistan windmill (Fig. 2). Possible mechanisms of the first vertical axle windmill of Sistan.

The second type of vertical axle windmill and its technical evolution

- The second type of vertical axle windmill brought two very important achievements in the technical mechanism and in its architectural form.
- In this type, the mill room is below the wind-wheel room.
- Here, in contrast of the first type, a wooden column that is shaped, keep the weight of the mill stone and make it suspended ; in the same time, the vertical wind-wheel turns the millstone by a metallic shaft in its bottom.
- The location of the wind-wheel room at the top of the stone chamber is a remarkable progress: it allows the windmill to increase its efficiency by using the winds blowing at a higher altitude: higher speed winds with more power .
- The specificity of the second vertical axle windmill makes it easier to use, especially on flat grounds like Sistan.
- when did this progress happen?
- Any development in the technical system of the windmill was related to the increase of its efficiency.
- In the sixteen century, the Safavid dynasty (1732-1501 A.D) succeeded in creating a unified and independent state from different local dynasties; Iran experienced a significant growth, particularly in architecture, trade and industries.
- During the Safavid Empire, thanks to stability and security, agriculture and trade developed all over of Iran (Nozari, 307 ,2002) and in this period Sistan found again its place as the grain reserve of the country. Therefore, there was a serious need for efficient windmills in Sistan.
- The transition of wind-wheel to China in the thirteen century by the Mongols.
- A Venetian technician named Verantius who featured in 1595 five or six types of vertical axle windmill .

The third type of vertical axle windmills, technical correction and urban role

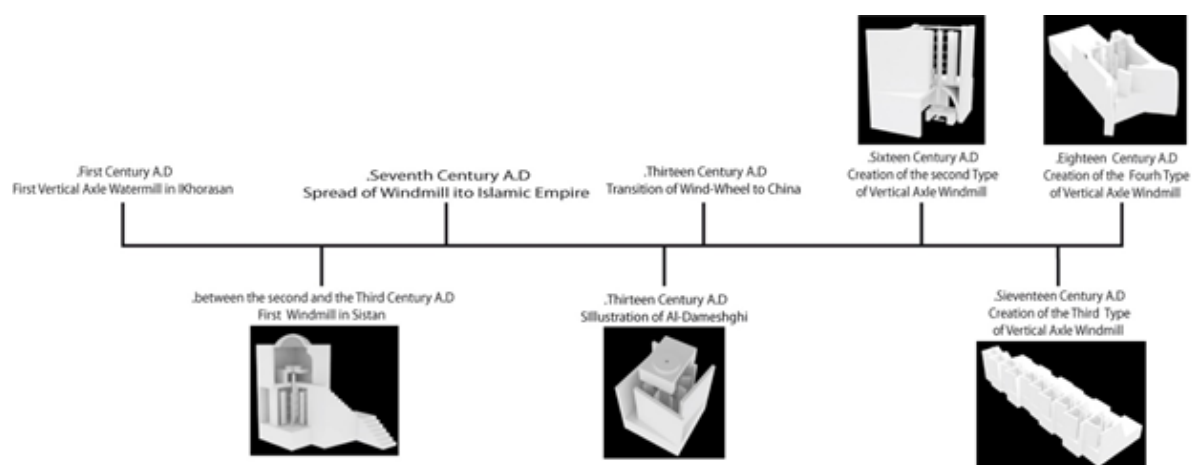
- The third type of vertical axle windmill differs from the second one by a significant technical improvement in the mechanism.
- In the third type of vertical axle windmill, the metallic shaft is modified and allows the millstone to be suspended and rotated.
- Another important issue is the integration of this kind of windmill in the urban tissue and in villages.
- The various chains of this kind of windmills protect cities or villages from strong winds.
- As it was mentioned before, two vertical axle windmills of the second type were recently found in Heart, 150 kilometers from Khaffe. It means that two different types of windmill, 150 kilometers far from of each other, still work today. How is it possible?
- It seems that the third type of vertical axle windmill could not have appeared before the eighteen century A.D. Herat was a part of Iran until the eighteen



century. From this time to the Paris treaty in 1875, several conflicts occurred between the local government of Herat and the Iranian government; these conflicts led to numerous wars. One of the direct results of these conflicts was a social and political separation between Herat and the rest of Khorasan. Therefore, because of this rupture, the windmill of Herat could not be modified with the new technical achievements seen in Iranian vertical axle windmills. Then it seems that the third type of windmill was created between seventeen and eighteen century A.D.

The forth type of vertical axle windmill, a morphological revolution

- In the evolution process of the vertical axle windmill, two lines of development appear: technical and architectural.
- The forth type of vertical axle windmill has the most developed architectural form.
- The fourth type of vertical axle windmill is greater and higher than all previous types.
- Its front face to the wind is modified into a collector funnel.
- The gathering walls which have created this funnel collect the wind streams and conduct them into the gaps of the northern facade.
- Another innovation related to this type of windmill is a kind of dividing blade which splits the wind into two streams.



Evolution chronology of the vertical axle windmills in Iran from second to eighteen century



16- Dolls & Rain-Seeking Rituals

¹
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2-Curatour

Iran has long been plagued by drought, as Darius in his inscription in Persepolis Pd D paragraph 3) asks Ahura Mazda to protect Iran from drought and lies. Iran According to reports recorded up to fifty years ago, rain-seeking rituals were occasionally performed in many parts of Iran, and in many of these areas, they are still performed. Rain-seeking rituals include making a doll or choosing a person and assigning a symbolic identity to it, holding a bouquet, pouring water, singing a prayer and singing a request for rain, receiving gifts from locals, baking bread or soup, marking bread or Another food is to hit someone who has a sign in his share until a guarantor is found and some other ritual acts are performed according to the geographical location.

Key words : Dolls, puppets, Culture, religion, Rain, Ethnic culture.

Dolls are more than decorative objects; as part of the earliest relics, they have played many roles in society. This study deals with the functions and aesthetics of Iranian dolls and puppets in art and humanity to show their importance. In most cases today, the dolls are at risk of vanishing. Based on regional diversity, abundance and currency, five examples have been chosen for analysis. Indigenous and traditional ritual of asking for rain is one of the customs that is rooted in the culture and religious beliefs of the people and is held in different forms in different parts of Iran. This good ritual is usually performed when there is less rain of divine mercy or when farms, pastures, gardens, mountains, plains and springs that are in dire need of rain and rain, with the participation of women, girls and children. It is performed at a young age and the help of the Creator God and prayer, sincere, sincere and benevolent request from the only creator of the universe based on the rain is performed along with the distribution of various vows and feeding of residents and passers-by. The most common and oldest The type of asking for rain is holding prayers and rain prayers, which are often



accompanied by sacrifices and vows. This ceremony is performed differently in different cities. Another ritual of asking for rain is a rain bride or a rain doll. The rain doll ceremony or the bride's spoon is one of the most comprehensive and common rain show rituals in different parts of Iran and even other countries. This ceremony was also performed in different areas to demand rain in drought



Photo: Left: Venus from Tappeh – Sarab, Neolithic (6000 BC)
 Source: National Museum of Iran
 Right: Clay fertility idols from marlik and (Sefid – Rud), Iran, 11th – 12th BC.
 Source: The private collection of Mohsen froghi.

The most ancient object that is similar to a real doll was found in Iran. Dated around 3000 BC, it was excavated in Jiroft, a city in the province of Kerman, the origin of the Aratta civilization. This puppet has a fragmented body with holes in its limbs. Yusef Majidzadeh, the Iranian archeologist and director of the excavations at Jiroft, believes that the limbs were connected the each other with an Iron wire via holes (Shadjou 20007:187) this suggests that they were dolls or puppets of that time. In this section, we introduce some dolls from different parts of Iran. Iran's very rich and fruitful history is very valuable in this regard.

Khorasan-Birjand

Othello is the name of a ritual puppet made in Birjand to ask for rain. This doll is for the rain-seeking ceremony of South Khorasan, and besides that, other traditions such as rain prayer have been common, especially in drought-prone areas, and these days, in every part of this land, we see rain prayers, votive



offerings, etc. to ask for. We are raining. This doll is a symbol of man asking God for rain to be watered. It is believed that it is more common in the villages and in many parts of the country, similar ceremonies or puppets are asked for rain, but what is performed in South Khorasan is specific to the province and national registration.



During the Othello or rain-seeking ceremony, a number of more patient youths make dolls out of wood and spin them in the village, standing in front of some houses and reciting poems in praise of God and the Imams. Depending on the situation of the family, they recite a poem and ask him for help and finally pray that it rains. According to him, with the money or materials collected, food is cooked and distributed among the people.



Ferdows-Choli Ghazak

In the city of Ferdows, the Choli Ghazak rain doll is called. It is customary for children to pick up a goat and walk in the desert and alleys, recite poetry, and sometimes go to the houses and take food from the landlord, such as chickpeas, raisins, and beans. The ritual of seeking rain is common in all regions, but the religion of each region is different and there are beliefs for seeking rain. In places such as Ferdows, Tabas and Sarayan, a doll called "Choli Ghazak" is made.

Choli Ghazak is a scarecrow and a wooden figure that children and teenagers in the villages move to people's houses and recite the following poems: "Rain Choli Ghazak and".

Due to successive droughts, in the village of Choli Qazak, the people of this region have made the ritual of asking for rain from God a part of their customs. These customs are performed with rain dolls (Choli Qazak) and carried around in the village by children and singing songs wishing for rain.

Choli Qazak is a wooden doll that is in the shape of a cross and by covering it, children sing in groups.

The children of this area go to the houses to recite poems, and the owners of the houses give them sweets and nuts according to the customs, and sprinkle water on Choli Ghazak.

The children share the sweets they have collected among themselves and the needy in the village.



Kurdistan-Bokeh varan

Bokeh Varan in Kurdish means rain bride. Kurdish children make this doll to wish for rain. Bokeh Varan is performed in different places with different poems and ceremonies. The history of making rain dolls is not clear. Regarding the roots, it is believed that in one of the villages of Kurdistan, during the drought, Sadati's daughter becomes the bride of a family. On the same day, the rain of God's mercy watered the thirsty lands of that village and the people of the village congratulate the height of this Sadat bride.

It is true that in provinces like Khorasan, due to the desert nature of the region, rain dolls are made, but this is not a reason that other regions do not want rain dolls. Another way to ask for rain is to make a rain bride with a wooden spoon, which is in different parts of Gilan.

This ceremony was also performed in Gilan full of water. The doll was called Katra Glenn. This doll was made with a wooden spoon. People at the crossroads distributed cooked food and cooked it en masse. This has been more common in rural areas. People returned the dishes but did not give the spatula and wooden spoon to the owner until it rained.



Gazvin-Chamcheh Galin or Khatoon

Chamcheh Khatoon is a doll that is rooted in the beliefs of the people of Qazvin province. This doll was made when dehydrated and with the intention of rain.

Chamcheh Galin or Khatoon in Qazvin is also made by old women. The old women go to the door with the singing children and get presents from the landlord. The landlord has to wet the doll's hands and then the old woman eats them with any beans she receives as a gift and distributes them among the people. After that, they pray in groups for the rain.

The Glen's Cheshmeh is a doll that is famous among the people of East and West Azerbaijan. Chamchemeh means big spoon and Glenn means bride. This ceremony was also performed by children. Maybe because they have a purer



heart to pray to God and ask for rain. One of the children was holding a stick and the children were walking in the streets in doll costumes. Their parents also went to the desert and prayed. Residents of Chaharmahal and Bakhtiari province also have the same doll with the same name.

Zanjan-Rain Doll

The Rain Doll Ceremony is one of the most comprehensive rain show rituals in Zanjan. The girls gather in the yard of a house and bring a spoon (a large ladle), tie a piece of wood in the shape of a cross to it, fill the ladle with a cloth, cover it with a light-colored cloth, and cover a few pieces of clothing with a spoon and face. They paint it with charcoal and pick it up and walk around the village, and while another ladle is in the hands of another child, the landlord pours a spoonful of water on the bride's roof and pours some flour or herself or beans or dried vegetables into the ladle. After walking around the whole village, they collect the collected materials and cook them and distribute them among the residents and themselves. At the end, they throw some fire down from a gutter facing the qibla and recite a prayer and ask God to send good rain.

The traditional rain-seeking ritual is rooted in the culture and religious beliefs of the people. This ceremony is performed differently in different cities. Elements of dream, imagination and use of native and recycled materials have been used in making rain dolls. In the ceremony of asking for rain and making dolls in different geographical regions of Iran. Usually the position of leader is held by old women and children are considered as a symbol of purity. The Earth's elderly mother will look forward to the next generation of children to save the earth from drought, increase human resilience in harsh climatic conditions, and keep children engaged in playful play and shorten the severity of drought. The earth has always been confronted with the phenomenon of climate change and humans in the past by holding dreamy rituals. Ancient societies such as Iran have always been pioneers in protecting the environment with appropriate lifestyles with different geographical climates by referring to culture and subcultures.



17- Urban musealization with a view to the urban environment. Case study: Water museum of Valiasr street

Mohammad reaz Norouzi

Museum concept designer

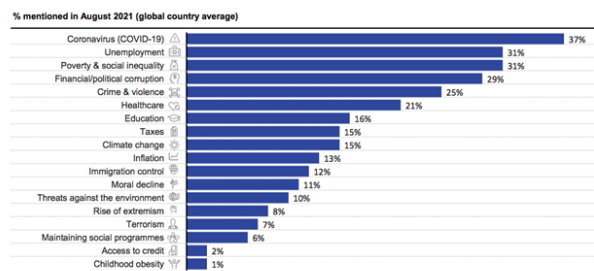
Today, among the United nation's (UN) 22 global issues, three of the headlines focuses on environmental issues and another five are indirectly related. It is also the same focus in UN SDGs 17 main global issues list (UN SGDs2015-). Similarly, it has been emphasized in united nations 2030's program and eke many researchers confirm its importance. Many people around the world and specifically in the developed counties consider it as the priority. Climate change is in the middle of the top 18 critical issues for the people (chart 1)

and with %15 it is placed on top 3s list in the table (Gebrekal,T. 2021) and in the last 5 years despite the pandemic it has always been incremental (Chart 2). These are clear indications that shows people's attention is shifted towards the climate change. In the last few days at Glasgow conference UK prime minister mentioned by delaying actions, we will have more consequences and costs in the future and will have to deal with Apocalyptic conditions. He mentions we are at "one minute to midnight", having run down the clock on waiting to combat climate change (Rowlatt J.,2021). Also, UNs secretary declared by failing to control climate change, humans will fail as a race. It is not sufficient to only put this level of attention to climate change by intimating and threatening based on current situations, loving earth and nature and education on how to maintain our relationship with our environment is also equally important.

We require to learn and educate to identify where the problems are, and for eliminating or reducing its impacts what we should do. Education is a key to this knot!

When we talk about education our minds first go to schooling, higher education, or formal institutions. There are no doubts that formal education is a big part of education but not sufficient. Non-formal education could have a more effective

q Which three of the following topics do you find the most worrying in your country?

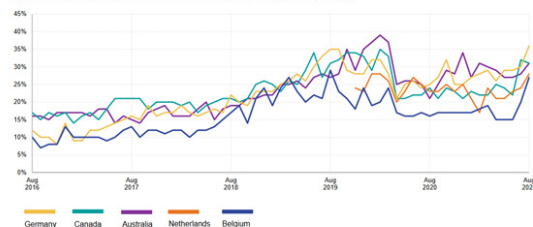


Base: Representative sample of 19,010 adults aged 16-74 in 28 participating countries, July 23rd – August 6th 2021.
Source: Ipsos Global Advisor. Global score is a Global Country Average. See methodology for details.

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CLIMATE CHANGE CONCERN

5-year trend of the top 6 countries most concerned about climate change (as of August 2021)



Base: Representative sample of c. 1000 adults aged 16-74 in Australia, Belgium, Canada, Germany and the Netherlands, 2016 – 2021.
Source: Ipsos Global Advisor. See methodology for details.

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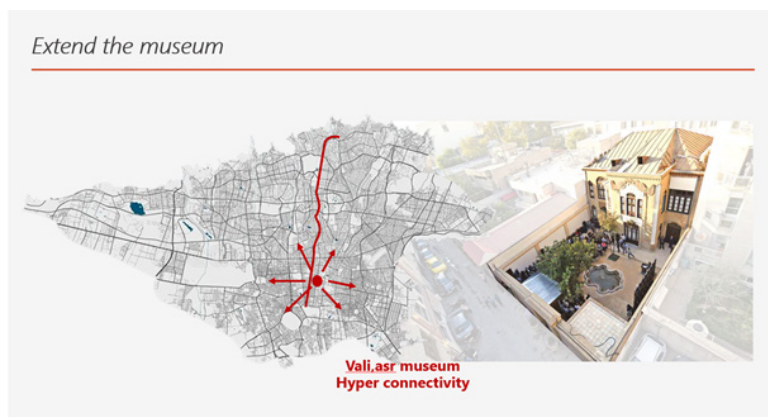
role in public awareness. Non-formal education has many benefits, such as personalizing content based on individuals (learner centric) that primary focus on learners needs and priorities. In another word, learners have a choice where to put their attention based on their need and capabilities and in which angel, they look at the issue. On the other hand, non-formal education could target a wider range of people from quantity and diversity point of view using a same number of resources (Cameron,2012,280). When we talk about non-formal education it should not be mistaken with informal education. Non-formal education is systematic and targeted, and its content is delivered somewhere outside of the classroom. That's where museums play their primary role, spaces dedicated to non-formal and informal education. In Iran (and almost anywhere else) a child spends %15 of their life at school to finish formal, compulsory education (K12). However, as Greg Behr from Pittsburg said, "learning do not start from school and do not end there" (Behr G.,2014,31). Based on my experience and research, I also believe Museums have a pivotal role in one's non-formal learning. museums must perform their role effectively.

There are attractive spaces and no need to force people in them. They have selective learning activities and using hand-on approach could massively optimize learning effectiveness. This instance emphasizes on museums social nature and reflects the fact that learners develop

deeper understanding by interacting with adults (parents, guides, etc.), peers and available technologies. Aside from that socialization that can improve the museums learning experience, it also appears that socialization is what they need to obtain a true understanding of the future and to transfer this realisation to their audience (Andre,L et al. ,2017). To bring socialisation not only use of updated technologies, but also social media and platforms are required. This is a challenge many curators and museum managers have on deal with daily. With this approach ECOM announced its (2018) moto around hyper-connectivity and encourages everyone to utilise and execute that.

Hyperconnectivity and socialization in museums to provide a social experience that is using lifetime and family-based learning is not only dependent on technologies. Here at Khiaban-e-Valiasr museum(Valiasr St. museum) in Tehran, me, and my colleagues chose to turn the neighborhood in to a museum with all its components.

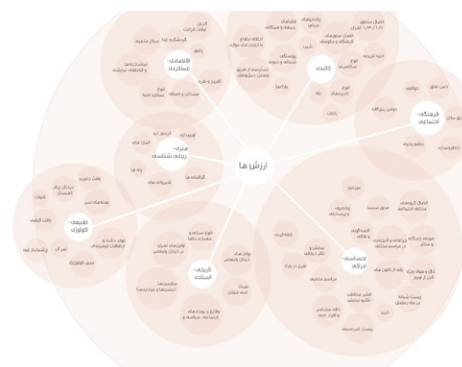
Therefore, we decided to instead of encouraging people to come to the museums and introduce the role that the neighbourhood plays in their day-to-day life, take the museums in the area, and demonstrate and engage them with the activities



planned, which won't interfere with their day-to-day life and won't disturb their normal stir. We planned the program in a way that transformed informal learning in to nonformal learning which was more in line with our objectives.

Initially we tried to identify the suitable elements and their priorities in our planning. To do that we index few of the significant factors. To do so, archive of building the neighborhood has been researched from (1921) to now, which included observations empirical data from personal experiences and interviews with residence and by passers. We gathered 86 different variables and named the "Values of the avenue".

In the next step categorized the data into conceptual groups and finally defined those groups for values of the Valiasr avenue. Among them environmental factors were highlighted as a priority for the people (by-passers, residents, historical texts, and initial ideation of the neighborhood in 97 years ago). Therefore, we chose this group (environmental issues) when we were designing the museum.

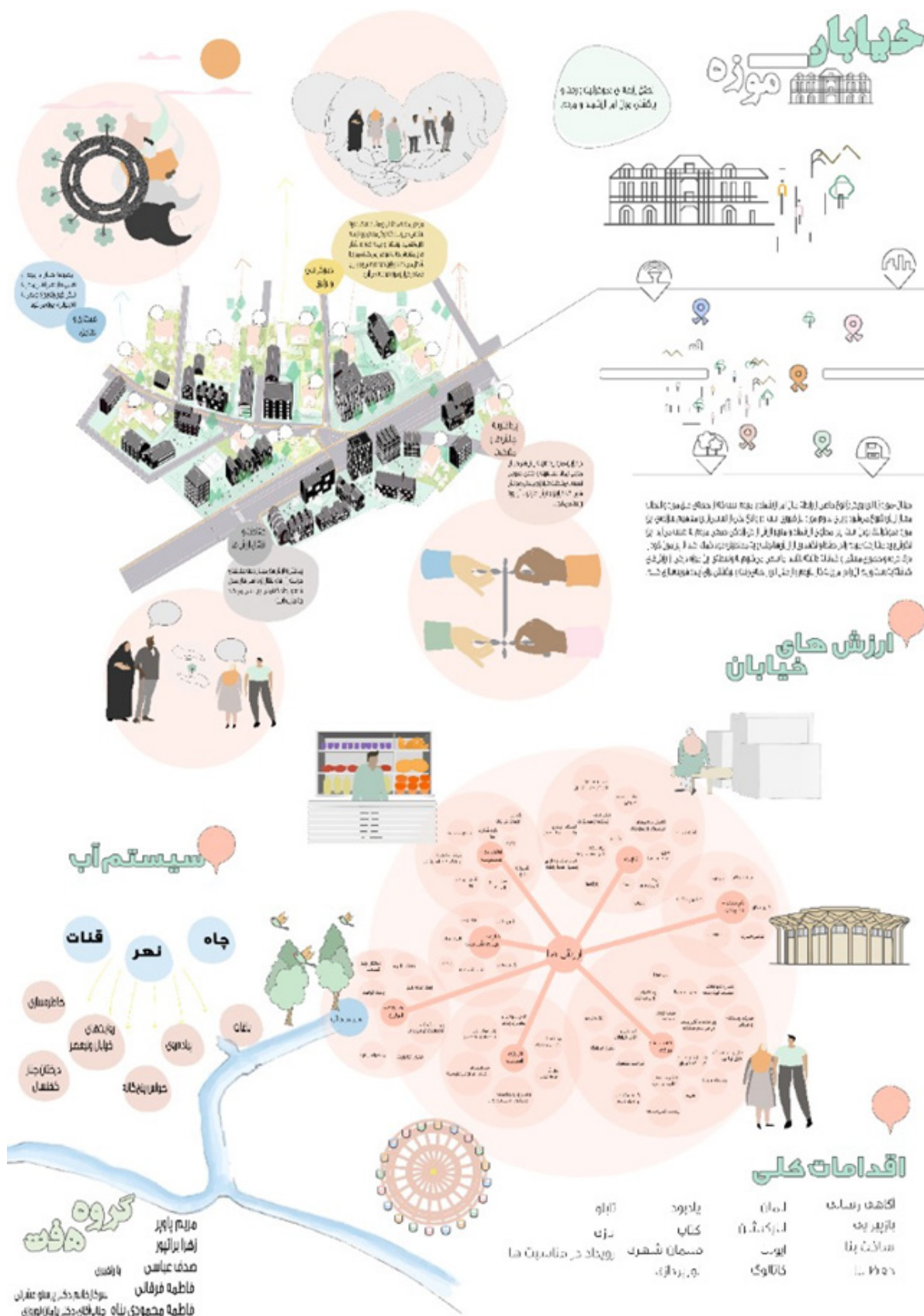


Among the values that are in this category, our attention went to the water related issues. For water being a serious issue in Tehran and Iran but also, because one of the main characteristics of this avenue are its Plane trees and the life of them are depends on the water situation. At the time that the street was built in 1920s, in both sides of the road were planted a Plan tree every 2 meters, which means 18000 unit in total. However, based on recent statistics (2018) there are only 9000 intact trees are left in both sides of the road, some areas denser than others.

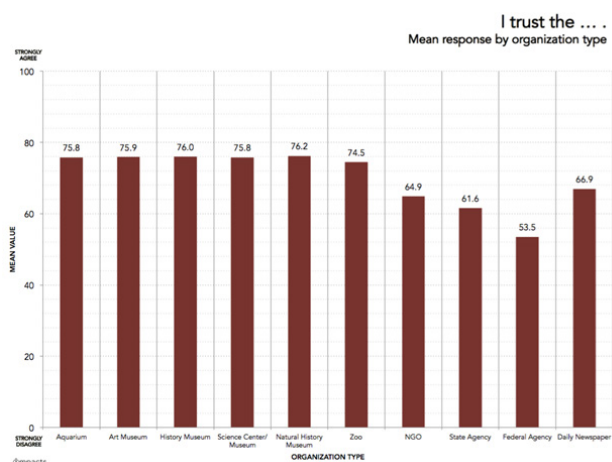
To water these trees and keep the district refreshed all the time, and, because of the other old neighborhoods that are surrounding this avenue, it was necessary to use all the possible facilities. As a result, there is a complex water network and structures in the area. There are kennels of water from the northernmost to the southernmost. Sets of wells, aqueduct, kennels, lakes, and other water resources and even water mills are spread across this road.

We identified all their locations in Valiasr Avenue. Some are active (like some wells in north of the city and some aqueducts in northern and central area) some are still there but not active anymore, and some others do not exist any longer and has been destroyed. we tried to index all of those and locate them on the map (hidden water network map of northern Tehran)





Before beginning this, there is an important point I need to mention. Should we provide direct education on the museums that we bring into city? Do we need to transfer set of information, facts, and numbers? Or is it adequate to just engage the visitors into the subject? People trust museums and the data they produce and publish (Impact Experience,2017); therefore, we could benefit from this public trust. However, because the street-museums are not going to interfere with their normal doing, to present the information we decided to use a game themed program (gamify) to exhibit illustrations to only be used as a “drawing attention” purpose and bring awareness and importance of water situation and dehydration in Tehran. Based on this we designed various elements, which we mention few in this article:



1- Presentation of hidden water network

Various fixtures in the neighborhood and its alleys that shows there was a water structure in that location in the past, that doesn't exist anymore, or it still is there but not functioning, or it is there but hidden (like aqueducts network under the ground). These stands in addition to declare what was there and familiarizing visitors with the history behind it (in form of a short text), it also indicates where the other stands and structures are and hidden in the water network. This shows a linear milestone of the network.

2- Depth of water

- Illimitable water consumption in the city cause the water level drops significantly and wells become out of use and therefore the need for digging dipper wells. However, because they are not visible around the city, they won't get fair amount of attention. As part of the program, using an exhibit, we tend to show the depth of the water in the range of every 10 years (using governmental data census) and audience can get involved by participating in a game using a pump which shows every time they pump out water, it gets harder, more costly and sometimes get impossible to extract water anymore (wells dried). This is a mechanical hand-on instrument.

3- Along with water

Kennels in Valiasr avenue from the northernmost part of the city to the southernmost part (central station) have been drawn both sides of the street



and with rain in second half of the year as well as opening the wells when there is no rainfall, you can start to see flow of water in them. In designing the museum, the kennels be seen as veins of the city. We attempted to install art works along those steams (such as fish figurines and ducks' status) and also where there were still water flow (specifically on school holidays) we designed water games (like making paper boats and float them in). The purpose of this section is to bring joy into a grim face of the city and the role water could play in creating happy moments in the life of children and adults.

4- Fountains: Micro plaza

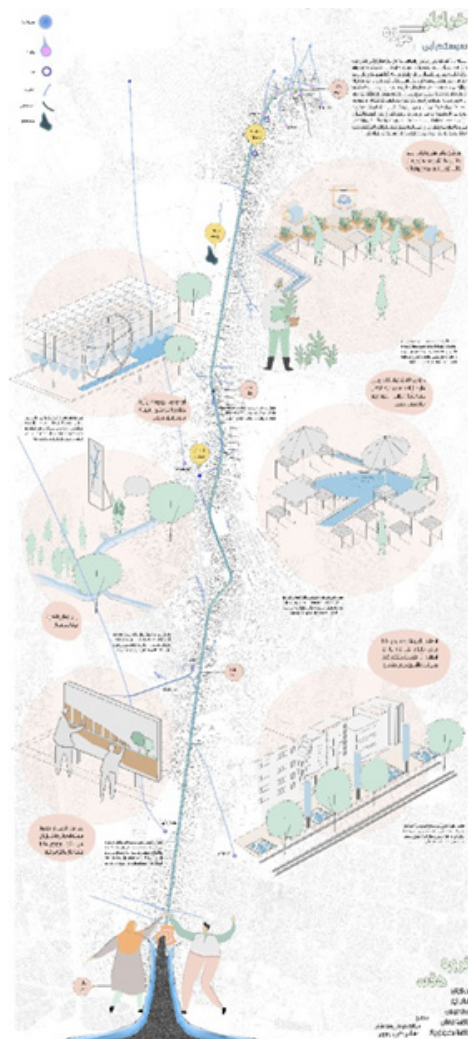
Fountains were built along the street where there were inactive water structures. These are spaces designed for people to sit down and have a rest. Places for assembly point and start tourism activities using few left Mirabs (guardians of water, who were responsible to distributing and managing water resources for agricultural purposes in villages, they had a significant presence in people's life and had a great respect among people) as a tour guild. Micro Plazas are similar to Macro Plazas but in smaller scales and can form along the verge of the street.

In our design, a well in north of Tehran, a water mill in central part, an aqueduct in south and multiple fountains in form of Micro Plazas have been planned. There are 4 of the water themed exhibits we planned for Valiasr Avenue Museum. Design team have few more exhibits and structures in pipeline that are currently passed the ideation stage and are being planned for development to be displayed in the street. Now there are two important steps: first to include a specific section in the actual Valiasr museum to include water section to support what is happening in the street museum and include information and more detailed attention to the subject. Secondly, involve people along the way to contribute into ideation of new ideas, and design new structures and exhibits based on that.

We are hoping by delivering this design, we could bring more attention to the issues around water management in cities and metropolitans to public and further.

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18- Role of UNESCO in environment conservation

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UNESCO and programs

The risks of Climate change, different types of pollution, loss of biodiversity, etc., push UN and UNESCO to support Member States to address environmental sustainability and take climate action via different programs like:

World Network of Biosphere Reserves

The World Network of Biosphere Reserves of the MAB Programme consists of a dynamic and interactive network of sites of excellence. It fosters the harmonious integration of people and nature for sustainable development through participatory dialogue; knowledge sharing; poverty reduction and human well-being improvements; respect for cultural values and society's ability to cope with change - thus contributing to the 2030 Agenda and the Sustainable Development Goals (SDGs). Accordingly, the Network is one of the main international tools to develop and implement sustainable development approaches in a wide array of contexts.

The World Network of Biosphere Reserves promotes North-South and South-South collaboration and represents a unique tool for international co-operation through sharing knowledge, exchanging experiences, building capacity and promoting best practices.

There are 714 biosphere reserves in 129 countries, including 21 transboundary sites.



Local and Indigenous Knowledge Systems (LINKS)

Local and indigenous knowledge refers to the understandings, skills and philosophies developed by societies with long histories of interaction with their natural surroundings. For rural and indigenous peoples, local knowledge informs decision-making about fundamental aspects of day-to-day life.

This knowledge is integral to a cultural complex that also encompasses language, systems of classification, resource use practices, social interactions, ritual and spirituality.

These unique ways of knowing are important facets of the world's cultural diversity, and provide a foundation for locally-appropriate sustainable development.

UNESCO Local and Indigenous Knowledge Systems programme (LINKS) promotes local and indigenous knowledge and its inclusion in global climate science and policy processes. LINKS has been influential in ensuring that local and indigenous knowledge holders and their knowledge are included in contemporary science-policy-society fora on issues such as biodiversity assessment and management (CBD, IPBES), climate change assessment and adaptation (IPCC, UNFCCC), natural disaster preparedness (ISDR) and sustainable development (Rio20+Future Earth). Working at local, national and global levels, LINKS strives to strengthen indigenous peoples and local communities, foster transdisciplinary engagements with scientists and policy-makers and pilot novel methodologies to further understandings of climate change impacts, adaptation and mitigation.

Education for Sustainable Development

UNESCO, as the United Nations' specialized agency for education, is entrusted to lead and coordinate the Education 2030 Agenda, which is part of a global movement to eradicate poverty through 17 Sustainable Development Goals by 2030. Education, essential to achieve all of these goals, has its own dedicated Goal 4, which aims to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all." The Education 2030 Framework for Action provides guidance for the implementation of this ambitious goal and commitments.

Education for Sustainable Development (ESD) empowers learners of all ages with the knowledge, skills, values and attitudes to address the interconnected global challenges we are facing, including climate change, environmental degradation, loss of biodiversity, poverty and inequality.

Learning must prepare students and learners of all ages to find solutions for the challenges of today and the future. Education should be transformative and allow us to make informed decisions and take individual and collective action to change our societies and care for the planet.

Education for Sustainable Development is recognized as an integral element of Sustainable Development Goal (SDG) 4 on quality education and a key enabler of all other SDGs (link is external). As the lead UN agency on ESD, UNESCO is responsible for the coordination of the ESD for 2030 Framework.



“Learn for our planet” is a global review of how environmental issues are integrated in education, recently issued in this field.

Environmental Sustainability at UNESCO

UNESCO has been putting a strong emphasis on the field of environment through different programs in line with UN strategy for sustainability management 2020-2030 at its headquarter, buildings and Field offices.

The UN Strategy for Sustainability Management 2030-2020 has set ambitious targets for all UN organizations to improve their environmental performance, aiming notably to accomplish a %45 reduction of greenhouse gas emissions compared to 2010 levels.

• Establishing a certified Environmental Management System (EMS)

UNESCO has committed to setting up and implementing an Environmental Management System (EMS) in line with ISO14001 standard as the key framework for addressing the organization's long-term environmental performance. This way, UNESCO will be able to structurally plan, control and continually improve its impacts on the environment while increasing operational efficiency. Unesco is aiming to receive ISO certification in 2021.

• Reducing carbon emissions: towards climate neutrality

A key objective of UNESCO's environmental actions is to substantially cut carbon emissions: in line with the targets of the UN Strategy, we need to achieve a %45 reduction by 2030. In addition, all emissions which cannot be reduced will be compensated by purchasing offset credits. To finance these measures – and to raise further awareness on the environmental cost of air travel – UNESCO is establishing an internal carbon tax (from September/October 2020, tbc): a small levy on all flight tickets purchased, across Offices. This way, UNESCO will be able to claim carbon neutrality as of this year.

• Waste: reducing, recycling, and eliminating single-use plastics

In June this year, new waste recycling stations were put in place in at Headquarters. They collect paper, plastic and other residual waste and can be found centrally on every floor. Individual office bins have been removed: This shall ensure better awareness and encourage sorting and reduction of waste by staff. The Miollis and Bonvin buildings will follow later this year.

In addition, gradually are banned single-use plastics from all UNESCO premises. At Headquarters, new water dispensers – producing both cold and hot water – shall help refrain from purchasing single-use plastic bottles. The longer-term plan is to integrate a 'plastic ban' into UNESCO's procurement policy.

Several Field Offices, such as Bangkok, Lima and Nairobi, have already adopted similar waste and plastic reduction policies.

• Protecting biodiversity and promoting urban agriculture

Shortly before the lockdown Unesco was able to inaugurate the first vegetable garden at Headquarters, managed by Noocity. Staff can now sign up for regular vegetable baskets and gardening workshops.



During the summer, a second eco-responsible garden, set up in collaboration with the French National Commission, has also seen the light. It will offer on-site educational workshops and side-events on sustainable development, focusing on life sciences education, sustainable food, sustainable cities, biodiversity and climate change.

The Headquarters Committee had been fully involved in the planning of these two projects.

The two gardens represent a coherent spatial entity and send a strong symbolic message about UNESCO's commitment to biodiversity and sustainable development in a context of climate change and ecological transition. Events, workshops and other activities are planned throughout the year; the full programme will probably be presented in September.

Many Field Offices also have or are planning to start their own gardens, such as in Ha Noi, New Delhi and Tashkent.

● **Creating awareness and involving staff**

A crucial factor for the success of environmental management is the awareness and participation of staff. This is why effective communication around the EMS, behavioural change campaigns, surveys and staff action days at global level are key. The current telecommuting situation still limits the scope of what we can do, but for now, an intranet page and a monthly newsletter have already been set up. More systematic action campaigns will follow, which will also involve and target other tenants of UNESCO buildings, such as Permanent Delegations at Headquarters.

In the framework of the establishment of the EMS, many other measures – for example with respect to the reduction of energy and water consumption; organization of sustainable meetings – are part of the roadmap. This page will be updated regularly.

"Towards a Green UNESCO" is New Guide for Staff launched on March 2021, written by staff for staff. It provides concrete tips to reduce one's environmental footprint in their daily work and actively contribute to greening UNESCO. It contains nine parts – from commuting, office life, events and missions, lunch breaks and greening at home. Comprehensive figures and facts, as well as examples of good practices across UNESCO's Headquarters and Field offices, complement and support the list of action-driven solutions.

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19- COVID-19 and climate change (Based on UN environment programme review)

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Abstract

The COVID-19 disaster should be a reagent for more democratization of environmental decision-making at all levels through improved use of digital space and complete consultative processes. The COVID-19 answer has led to increased use of medical supplies, including testing kits and protective equipment, as well as packaging/delivery supplies such as single use plastics. Effective and comprehensive waste management, including medical, household and other hazardous waste, is critical to diminish possible secondary influences on health and the environment initiated by the COVID-19 response. Country-level socioeconomic impact analysis of COVID-19, the Common Country Analysis, UN Sustainable Development Cooperation Frameworks and the UN Secretary-General's Call to Action for Human Rights are important entry points for building back better and for operationalizing the human right to a healthy environment. The rights of all people to benefit from science and its applications must also be safeguarded ensuring that solutions to global problems, like a vaccine for COVID-19 or environmentally sound technologies, are equitably shared by all.

Environmental poverty and biodiversity loss causes the conditions for an increase in the type of animal-to-human zoonosis that can outcome in viral epidemics. They also may donate to pre-existing medical situations, such as asthma, that make persons weaker to viral infections. More than 150 countries accept the right to a safe, clean and healthy environment in some system. The substantive elements of this right include a safe climate, water and sanitation, clean air, healthy and sustainably produced food, non-toxic environments, healthy ecosystems and biodiversity. These rudiments are preconditions for human health and pliability in the face of illness and for reducing the risk of zoonosis and expansion of existing disease vectors. due to the Human Rights Committee, environmental deprivation is one of "the most pressing and serious pressures to the ability of present and future generations to enjoy the right to life" and protecting the human right to life "depends on precautions taken by States parties to defend the environment". The COVID-19 reply should respect, protect and fulfil rights to a vigorous environment. our interactions with nature and wildlife. Around 60 percent of all infectious diseases and 75 percent of all emerging infectious diseases in humans, including COVID-19, are zoonotic. As an average, one new infectious disease emerges in humans every four months. Ecosystem integrity is the foundation of human health and development.



Human-induced environmental changes modify wildlife population structure and reduce biodiversity, resulting in new conditions that ameliorates particular hosts, vectors, and/or pathogens. Integrating the human right to a healthy environment in key environmental agreements and processes, such as the post-2020 Global Biodiversity Framework, is critical to a holistic response to COVID-19 that includes a re conceptualization of the relationship between people and nature that will diminish risks and prevent future harms from environmental deprivation. The poor and disregarded are among those worst impacted by both COVID-19 and environmental harms such as climate change, biodiversity loss and pollution that threaten full and effective enjoyment of all human rights. Environmental harms disproportionately impact individuals, groups and peoples already living in vulnerable situations – including women, children, the poor, minorities, migrants, indigenous peoples, and persons with incapacities. Crises such as COVID-19 increases those impacts, including through adverse effects on access to food and land, water and sanitation, housing, livelihoods, decent work, healthcare and other basic necessities. Fulfilling human rights, with the human right to a healthy environment, not only reduces unequal impacts, it also fosters more resilient societies. The COVID-19 pandemic demonstrates that society can only be as healthy as its most fragile members. The COVID-19 response should address inequalities and focus on protection of persons in vulnerable situations in order to leave no one behind. policies and practices that have contributed to our current situation. Rather than rolling back environmental laws and policies, it is time to step up environmental protection and enforcement in order to create resilience and reduce future pandemic risks, having in mind that short-term economic gains from deregulation often come at long-term costs. States should recognize the right to a safe, clean, healthy and sustainable environment in their constitutional and legislative frameworks, with effective remedies for violations of this right. At practical level, States can, for example, strengthen efforts to combat illegal trade in wildlife – reducing potential avenues for zoonosis and promoting the rule of law while ensuring alternative and sustainable livelihoods. Tourism dues often fund parks and conservation efforts.

The COVID-19 crisis endangers this revenue stream and funding against poaching, illegal wildlife trade and other forms of prohibited exploitation of natural resources, placing increased pressure on natural systems. Effective and inclusive preservation efforts are essential to protect healthy ecosystems and the communities that depend on them.

Environmental human rights defenders are essential allies in efforts to protect the environment and, by extension, human health during the COVID-19 crisis. Action is needed to protect both the environment and its defenders including, in many cases, Indigenous Peoples, whose worldviews and traditional knowledge can bring critical perspectives for sustainable and rights-based growth. Boundaries on civic space undermine the crucial advocacy of environmental human rights defenders, which in turn can pave the way for short-sighted and dangerous



actions. Defenders should be allowed and protected from threats, reprisals, and harassment, including as relating to emergency decrees and legislation. The International Treaty on Civil and Political Rights and other international human rights instruments establish that participation and access to information are human rights. The importance of participation and access to information in environmental matters has been frequently reaffirmed, including by Rio Principle 10, the Paris Agreement, the Aarhus Convention and the Escazù Agreement. Governments and businesses should be clear in sharing related information related to their efforts to address environmental and health crises and ensuring the informed participation of all persons in decision-making processes that affect them. During this crisis, Governments and the international community should find new ways and modalities of functioning. Environmental governance should be modernized, including through general and rights-based tools for digital participation and access to information, ensuring that essential environmental decision-making continues in an inclusive and effective manner regardless of the exigencies posed by COVID-19. Meaningful, informed and effective participation of all people is not just their human right, it also leads to more effective, reasonable and inclusive environmental action. Drawing on the diverse interests, needs and expertise of all people, including women and girls, local communities and indigenous peoples, offers important insights for inclusive and sustainable environmental action. The COVID-19 disaster should be a catalyst for further democratization of environmental decision-making at all levels through improved use of digital space and inclusive consultative processes. The COVID-19 response has led to increased use of medical supplies, including testing kits and protective equipment, as well as packaging/delivery supplies such as single use plastics. Effective and comprehensive waste management, including medical, household and other hazardous waste, is critical to minimize possible secondary impacts on health and the environment caused by the COVID-19 response.

The poorest, most vulnerable and marginalized communities without access to waste treatment or sanitation infrastructure have been, and will continue to be, hit the hardest by secondary effects on health, maintenance and rights. Preventing environmental harm and ensuring the full and effective implementation of basic human rights such as those to health, a healthy environment, and water and sanitation, is critical to avoid and curtail the risk of infectious diseases. States and other duty-bearers should ensure the safe handling and removal of waste as a vital component of an effective and comprehensive emergency response and treat waste management, including of medical, household and other hazardous waste, as an urgent and vital public service. Effective and reasonable management of biomedical and health-care waste should be assured through appropriate identification, collection, separation, storage, transportation, treatment, protection, training and disposal. A rights-based approach to the COVID-19 recovery and response requires that we build back better and more



sustainably. Economic stimulus packages should guard and benefit the most vulnerable while advancing efforts to fulfil human rights, achieve the 2030 Agenda and the SDGs, and limit global heating to the greatest extent possible. The response to the crisis presents an opportunity to support improved social protection measures, and a just transition to a sustainable, no-carbon economy founded on renewable energy, environmentally sound technology, sustainable resource use, community empowerment and livelihoods of dignity. States should work jointly and individually to mobilize the maximum available resources toward building back better. Country-level socioeconomic impact analysis of COVID-19, the Common Country Analysis, UN Sustainable Development Cooperation Frameworks and the UN Secretary-General's Call to Action for Human Rights are important entry points for building back better and for operationalizing the human right to a healthy environment. The rights of all people to benefit from science and its applications must also be safeguarded ensuring that solutions to global problems, like a vaccine for COVID-19 or environmentally sound technologies, are equitably shared by all. Over the long run, inclusive, sustainable and equitable economies are more robust. All States have an obligation to pursue development that benefits both people and the planet and equitably distribute the benefits thereof. Businesses have a responsibility to respect human rights and it is also in their best interest to pursue sustainable development. In the face of global risks, rapid, evidence-based, participatory and collective action not only produces the best results, it is also fulfilling human rights obligations. Effective responses to COVID-19 and environmental crises should be global responses grounded in solidarity, compassion, respect for human dignity and ecological integrity. The required actions and international cooperation must build on obligations of States and other duty-bearers in international legal frameworks and instruments such as the Universal Declaration on Human Rights, the Declaration on the Right to Development, and the Rio Declaration. Collaboration between governments, international partners, civil society, activists, the private sector, and all individuals and peoples are needed to fulfil human rights, including rights to a safe, clean, healthy and sustainable environment, and to achieve sustainable development that equitably meets the needs of present and future generations.

20- Plans for a new sustainable Museum of Energy in Denmark

Jytte Thorndahl

Curator

The vision

The next ten years will be crucial for the destiny of the green changeover. The next ten years will provide still more challenges, but also new technological innovations.



There is a great need to understand, share knowledge, motivate young people to think and act in a sustainable way in their choice of study and in the settings for a very important part of Danish history. We can hardly wait to see this development coming. Thus, there is a need for a strong and modern Museum of Energy, the sooner this museum is ready to open the better it will contribute to the great change into renewable energy, new habits of conduct in eating, transportation, recycling etc. The creation of the New Museums of Energy will fulfill many needs, and by choosing a sustainable and circular economic design, the museum will show the very best within sustainability as well in its content and its architectonic design, and in this way underline the Danish ability to think in a holistic way. To have function and form melt by combining old and new will evoke a response far beyond the borders of Denmark.

For many years there have been plans for a new museum of Energy in Denmark. We have already had two architects drawing plans for a totally new building – but what about the existing house made of red bricks – should all the bricks, cement and roof tiles be taken down using a lot of energy for demolishing and transport to make space for a new one. What if nosy journalists start counting the number of lorries transporting this material out of the area and bring a story – about the Danish Museum of Energy that is supposed to bring new knowledge about recycling, reuse, ways of saving energy and outlet of CO₂. And later huge lorries will arrive with lots of steel and concrete for the new building.

Therefore, the director of the museum suggested to the board of the museum that we should not build a new museum in the usual way: Which is....

You hire an architect, preferably one that is known by the media and press. 2) The architect draws a new museum building 3) A fund is established 4) You search for money during 1 to 10 years. 5) The museum closes for two years. 6) The fund builds a new museum. 7) You move into the new building.

But what about United Nations sustainable development goals and circular economy that all museums should follow? At least we do so in Denmark – all schools, institutions, universities, etc. should know about them and try to behave accordingly.

What can we do to create a sustainable museum building?

- Use what we have to create what will be. Transform and unite.
- Development grounded on sustainability and circular thinking.
- Disseminate the meeting between past and present – a future with renewable energy from earth, water, wind, and sun.
- Use the location and possibilities of the open-air museum to create meetings between knowledge, nature, activities, and experiences.
- Everything will be created relying on a solid economic foundation, through transparency and safety.

Before we go further – let us look at which group of visitors visit our type of



museum, the science museums in Denmark:

In general, the audience at science museums can be grouped into 6 groups:

- 1) The classic cultural person – often a woman – will visit art museums and historical museums to know more 22 %
 - 2) The come along person who follows family and friends to have a nice day 16 %
 - 3) The person seeking adrenalin and suspension 21 %
 - 4) A person who likes learning and concentration to broaden her mind 15 %
 - 5) Openminded and creative person 14 %
 - 6) Person who wants to do as little as possible – maybe watch a movie 12 %
- But persons from these group also sometimes bring children along to the museum – and they tend to focus on

Segments for experience with children

1. Learn and play: Experiences being together, having fun and interaction – as the best way for my children to learn new things 29 %
2. Loss of fun: As an adult I do not need to do much. The important things is that I know it will be fun for and involve my children 16 %
3. See and learn: I would like to pass on cultural knowledge to the children. I will introduce them to many classic cultural experiences that I like. 11 %
4. Fun and action: I like to do many different things with my children. I prefer experiences with children full of energy and physical activity. 29 %
5. Home is best: Experiences with children is something that primarily takes place at home. Sometimes we could go to a museum or a football match, but not often. 15 %

Who can we attract to visit the science museums?

The classic culture persons, the openminded, Depth and learning and when they bring their children or grandchildren: Play and learn, see and learn and speed and action – and maybe others – but we are fishing in deep water for the last groups

But what about their attitude to sustainability:

All segments find that everyone offering experiences have an obligation to follow the agenda of sustainability.

But how do we manage sustainability within cultural institutions? How to create and support sustainable tourism?

The level of sustainability in tourism/cultural institutions like museum can be measured in the Gross National Product – which part does it play?
We can also look at the number of workplaces in sustainable tourism



When looking at a museum you could have the following visions of sustainability:

1) The Environment 2) The Cultural sustainability 3) The Social sustainability and 4) the Economic sustainability

1) Environmental sustainability – goals are clean energy, climate action, responsible consumption

50-60 % savings by choosing to reuse the building = will save about. 400 tons CO2 outlet
25-35 % savings of CO2 by using wood in the main building will save 250 tons CO2
Concerning the transformation and reuse of the existing buildings – we will make a new climate shelter and optimizing of energy (with solar and wind) – the aim is to reduce materials and energy of the lifecycle of the museum
We plan to integrate renewable energy and intelligent building management ISO 50.001

We will create a better climate inside for humans and exhibitions.

2) Cultural sustainability

The aim is to preserve the history and future stories about energy in Denmark and to show that a specific technology, innovations, and high quality is the base of sustainability of the museum.

The museum building should also be the home of collections, conservation, and dissemination of energy in buildings and in the open land.

3) Social sustainability

Humans are at the center of nature, learning, adventures, and energy.

The museum should offer fuels for brain and body, promote healthy food, local food. Support movements, and exercise.

Demands in working environments, security and health in transformation and daily work.

The museum should give access for all, also disabled people in buildings, exhibition, and outside area.

The museum will be working with local community and users of the outside area.

4) Economic sustainability

We will gain savings by transformation and rebuilding of the museum.

We will balance economy, quality and efficient use of buildings and open areas. A sustainable business-case will be chosen with solutions, that helps the daily running of the museum

The museum will have a circular economy from design to running and maintenance. Total economic analyses will be used. So, bricks, tiles, etc. will be stored at the place and reused as much as possible.



What will it look like?

An outside area for wind power – with important wind turbines – a round shaped park will be established for the wind turbines and solar energy panels.

House of Electricity – will be insulated and have more windows – will house the black fossil development of energy at the ground and the green renewable energy technologies at the upper floors

Main building – today hosting café, small exhibition hall, ticket sale, shop, toilets and offices.

Existing main building: 1170 m ground floor and 80 m first floor

Existing main building

The existing roof, light walls windows and doors will be removed and used again, if possible.

Main building renewed.

1250 m ground floor and 650 m first floor

2

Main building with new wooden structure all the way round the new building. The renewed building will host 2 permanent exhibitions, and a room for temporary exhibition plus a place for experiments. In addition, there will be a library/archive and offices for the staff of the museum as well as a café and kitchen and toilets.

At the moment we are working with architects, specialists in circular economy and reuse, out door architects and museums exhibition specialist to finish a written lay out/prospects of the renewed buildings, outdoor areas and planned exhibitions. This we be finished by February 2022 and at that time a Foundations will start raising money for the renewal of the buildings for a New museum of Energy in Denmark.

21- Green Management Indicators in Iranian University Museums: Provide indicators for Alzahra University museum

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Objective: Presenting green management indicators of Alzahra University Museum.

Research Method: The present study has a quantitative approach and an applied goal type. Also, the method used in this research is a descriptive survey. The current study population was also experts of Iranian university museums. In this study, a questionnaire was used to collect data. First, a questionnaire was designed based on the indicators provided by Green Metrics for green

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management in universities. The questionnaire was then distributed electronically among the experts of the university museums. The results were ranked based on statistical analysis, and finally based on this, green management indicators were presented for Alzahra University Museum.

Findings and Conclusion: The findings of the present study showed that Iranian university museums need different and specific indicators with the characteristics of the museum and at the same time in line with the global green management indicators of universities. Also, green management and its indicators in university museums have different dimensions in terms of space and architecture, equipment, recycling management, transportation, and training, which requires short-term and long-term attention and planning. Most of the indicators examined by the research community are essential. Also the present study showed that the indicators of green management in universities are in line with the goal of university museums, so museums from the university create a green information system in universities, identify the components of green management and help to develop green management in the university.

Keywords: Green Management, University Museums, Indicator.

Introduction

A museum is a place that collects and preserves various works, samples, and information related to scientific, cultural, and technological topics, activities, and achievements on behalf of the community and presents them in the form of exhibition collections with the necessary explanations and using them. Provides various information methods and archives of scientific information for public use so that visitors can use them according to their needs, interests, and scientific and professional background. In addition, the museum provides a basis for the creation and dissemination of scientific thought in society by holding various scientific and educational programs.

Museums shape our view of the world. They help us understand who we are and the world in which we live. They influence how we think and how we behave. They are, therefore, uniquely placed to help change attitudes towards all sorts of contemporary issues. Museums are ideally placed to make a difference (green museum step by step¹). Among museums, university museums hold an essential part of organizational memory. The University Museum, while collecting works assigned to the university, professors, and students, with a new perspective on the scientific atmosphere of society, creates an introduction to the creation of new and profound research works. The University Museum represents the path of development of science, education, and research and provides researchers with a good understanding of the scientific progress of society. In addition to researchers, students, thinkers, professors, and staff, the University Museum can provide information services to indigenous and local people. University museums provide services to managers for better decision-

1- <https://ocm.iccom.org/documents/green-museums-step-step-guide>



making, establishing a relationship between the scientific and cultural community of the country with senior managers.

As centers of science production, universities have a special place in the country's sustainable development. In recent years, with the identification of the dimensions and components of green management, universities have become centers for establishing knowledge management.

Green management emphasizes integrating the relationship between the environment and management. It includes intertwined environmental and management processes, which begins with the observance of green principles in the mission and vision of the organization and continues to align and emphasize the same organizational and environmental goals to achieve sustainable development in the long run Ghorbanpour, Ahmadi, , and Reza Jalali, 2020. The use of green management has reduced the consumption resources of organizations and has contributed to their profitability. On the other hand, increasing the quality of human resources improves the environmental and economic performance of the organization.

On the other hand, the Green management approach, resulting from attention to sustainable development and, consequently, organizational sustainability, along with social approaches and economic incentives, health and safety of society, employees and the publication of the desired public image of the organization in the long run (Tavakoli and Others, 2018).

The creation of green management components was started in 2009 by the University of Indonesia, and by 2015, ranking indicators had been developed. Other rating systems have studied and developed these indicators, known as the Green Metric components. Green Metric includes the six axes of infrastructure, energy, and climate change, waste, water, transportation, and education. Currently, the issue of green management is raised in various fields. One of these areas is green management in museums. In the green management of museums, several indicators can be considered in short-term and long-term programs and evaluation of museum activities.

From the perspective of museums, green management components are also included: People, the social dimension of museums; Social welfare, educational and research opportunities, sustainable tourism, environment, waste management and reduction, transportation, health, economic growth, urgent climate measures.

Today, many museums around the world have moved towards achieving the goals of green museums. Green museums, while educating the public about the use of environmental resources, effectively create a healthy environment, a healthy society, and healthy people. Green activities in museums also save money on organizations' budgets (Dedeoglu, 2020). Also, as museums are located in one of the most important places for the production of science, university museums have an important role in conveying social and cultural points.

One of the cultural and social points is the transfer of the importance of the



issue of green management. In fact, these museums can play an important role in transmitting the culture of green management in society by implementing its indicators in their programs. Alzahra University is also one of the universities that has taken effective steps towards green management. Therefore, it seems that paying attention to the issue of green management in the museum of this university is very important

According to preliminary studies, it seems that many studies in the world in the field of green management in museums have been done, but none of them have been done in the context of university museums, and indicators for green management in this context have not been provided. In addition, despite the rapid climate change in Iran and the importance of paying attention to green management in the university museums of this country to preserve an important part of the history of this land, it seems that research on green management, especially research in Iran None of them have been in the context of university museums. Therefore, the present study examines the indicators of green management for university museums in Iran from the perspective of experts and provides appropriate indicators for green management in the Museum of Alzahra University.

Research background

According to preliminary studies, it seems that no research has been done on green management and its indicators in the context of university museums. Therefore, the most relevant studies in this field are discussed below.

Cole, Lindsay, and Akturk(2020) have studied green standards in green museums in a study entitled "Green building education in the green museum: design strategies in eight case study museums." This study shows that recycling, water, energy, green materials, and environmental landscaping are the five main issues of green buildings that museums interpret. This study also points out that when a science museum invests in green building design, they unlock more than just potential energy savings. The green facility itself presents an opportunity to align museum architecture with the educational mission.

Dedeoglu (2020), in her dissertation entitled "GREEN MUSEUMS: AN INTRODUCTION AND A POSSIBLE IMPLEMENTATION IN ANKARA" examines the concept of green museums, explores information sources in this field, examines the possibility of a green museum in Ankara as a case study, and offers suggestions for its implementation. She also discusses the principles needed to become a green building. Some of these include selecting sustainable materials, the optimal use of water and energy, renewable energy sources, and waste management. The results of this study show that according to the green building ranking tools, a green building, so the museum, should as much as possible of special principles such as choosing a location for a new building, choosing green transportation, energy-saving, management Water efficient, use environmentally friendly materials. On the other hand, she pointed out that people have difficulty understanding the complex mechanisms of climate change and environmental



pollution and adopt environmentally friendly behaviors. Green museums can shed light on these issues by using their unique resources and communication channels to engage communities and equip citizens with the knowledge to work towards a sustainable environment. Targeting mostly children can influence the future, thus turning green museums into partners in the solutions to the deteriorating global environment.

Also, Ghorbani, Babalhavaeji, and Noushinfard(2017), in a study entitled "Indicators for Sustainable Management of Green Libraries: a Qualitative Research" have developed sustainable management indicators in Iranian libraries to achieve a green library. This study shows that sustainable management strategies identified in the conceptual model are a combination of strategies. General and specialized strategies are in the field of the library. Strategies such as waste management, Optimal energy consumption and use of renewable energy, attention to the optimal use of natural resources Such as paper, the use of raw materials and environmentally friendly equipment in the library, according to Green space in the outdoor environment, roof and indoor environment of the library, proper use of technology Day, sustainable development education, participation in social programs of sustainable development and protection Environment and interaction with other organizations are among the strategies in any organization It is applicable for sustainable management and is in the hands of general strategies. Pop and Borza (2016), in their study entitled "Factors Influencing Museum Sustainability and Indicators for Museum Sustainability Measurement," identified factors that determine the sustainability of museums and how they were measured. In this study, based on literature analysis and respondents' factors affecting sustainability based on respondents, they provide a set of 33 indicators that museums can use to measure their sustainability and a model. It is proposed to evaluate the sustainability levels of different museums comparatively. Of the 33 indicators presented in this study, the following 5 indicators seem to be related to green management

	Indicators
1	Consumption of electricity
2	Consumption of thermal energy
3	Consumption of water: Consumption of water
4	Consumption of consumables
5	Consumption of fuel

Table 1 - Indication of green management



Reclite (2016), in his dissertation entitled "THE EVOLVING MUSEUM: GOING GREEN IN COLLECTIONS MANAGEMENT PRACTICE AND POLICY," examines the process of "greening" in museums by assessing how this transition affects the way museums take care of collections. The study also concludes that museums should continue to improve the environment in their collection practices to ensure the care of objects and services to their communities for future generations.

Research Method

There are three questions in this research. What indicators are important for green management in university museums? What are the proposed indicators for green management in Alzahra University Museum?

The present study has a quantitative approach and an applied goal type. Also, the method used in this research is a descriptive survey. The study population is also experts of Iranian university museums. In this study, a questionnaire was used to collect data. The questionnaire of the number of indicators provided by Green Metrics was designed for green management in universities, which has the necessary validity and reliability due to standard indicators. The questionnaire was then distributed electronically among the experts of the university museums. The research population is 69 people, and 12 people answered the questionnaire. The number of university museums registered at universities museums and collections [1] in Iran is 25. Overlapping the answers in the same museums, different views of museum owners on green management, and insufficient knowledge of green management by museum owners are the reason for the low response to the distributed questionnaire and the problems of the present study.

To analyze the questionnaire, the indicators are ranked and analyzed based on the data obtained from the research and the relative frequency percentage, and then the appropriate indicators for green management were presented in Alzahra University Museum.

Findings and Conclusions

University museums, as one of the information centers in the university, in addition to communicating with the cultural, scientific, and educational community, also communicate with the indigenous people of the region. Therefore, for conducting the research, the indicators presented by Green Metric, the green management evaluation indicators of Alzahra University, and the green management indicators of museums presented by the World Council of Museums were examined, from which the following indicators were extracted to evaluate the green management of university museums.

Due to the relationship between the indicators, first, each indicator's rank and frequency percentage is mentioned. Among them, the indicators with the highest rank and frequency percentage are presented to provide a proposed framework for the green management of university museums. The rank of each indicator



indicates the importance and percentage of its frequency in each area indicates the effectiveness of the indicator in the field of green management.

Indicators area	indicators
Budget	The ratio of university budget to green management budget
	Total research budget allocated to research related to the subject of environment and green management
	The ratio of the university museum budget to the green management budget
Infrastructure	Technology infrastructure for digital access to the museum collection
	Execution and implementation of smart buildings
	The amount of green space allocated to the University Museum
	The ratio of the parking space of the university museum to the total space of the university
	Number of transportation initiatives to reduce the use of private vehicles
Sustainable tourism	Creating sustainable jobs in the university museum
	Preservation of natural heritage within the university
	Get a steady income from tourism at the University Museum
Education and Research	Number of courses / courses offered related to environment and sustainability by the University Museum
	Number of scientific publications published in relation to the environment and green management
	Number of scientific events related to environment and green management
	Green management action reports
	Activities carried out in order to inform the communities about green management
Water	Management of water consumption and wastewater disposal in the university museum building
Renewable sources	Replace energy efficient appliances instead of conventional appliances
	Implementation of green building policies in the university museum building
	The ratio of renewable energy production to total energy consumption
	Number of renewable energy sources inside the University Museum



Electricity	The ratio of electricity consumption to the space of the university museum
Waste Disposal	Policies to reduce the use of paper and plastic in the University Museum
	University Museum Waste and Waste Recycling Policies

In the budget field, three indicators have been studied, all of which have a significance of 10, and the indicator of the ratio of the university museum budget to the green management budget has a frequency of 44.44%. The other two indicators have the same frequency percentage of 27.27%. Therefore, the average frequency percentage of the budget indicator is 33.01%.

In the field of infrastructure, all indicators are important ten that the indicator of implementation and implementation of smart buildings has a frequency of 54.54%, the ratio of parking space of the university museum to the total space of the university, and the number of transportation initiatives to reduce the use of private vehicles. The same frequency is %45.45, the technology infrastructure for digital access to the museum collection and the amount of green space allocated to the university museum also has a frequency of 27.27%. The infrastructure area has an average of 39.99.

In sustainable tourism, creating sustainable jobs in the university museum has a relative frequency of %36.36 and preservation of natural heritage within the university 27.27% and is ranked 10th and receiving sustainable income from tourism in the university museum is 45.45% and ranked 9th Is. The average frequency of sustainable tourism is 36.36%.

All indicators in the field of education and research are also ranked 10th. Frequency Number of courses /courses related to environment and sustainability offered by the University Museum 45.45%, Number of scientific publications published in relation to the environment and green management 40%, Number of scientific events related to environment and green management 40 Percentage, reports of green management measures 45.45% and activities carried out to inform the public about green management is 27.27%. The average frequency of education and research is 39.63%.

The indicator of water consumption and wastewater disposal in the university museum building is 45.45% and has a rank of 1.

In the field of renewable resources, all indicators are ranked 10, replacing energy-efficient devices instead. The use of conventional equipment and implementation of green building policies in the university museum building is 27.27%, the ratio of renewable energy production to total energy consumption is 45.45%, and the number of renewable energy sources inside the university museum is 54.54%. They have



allocated themselves. The average frequency of renewable resources is 38.63%. The indicator of the electricity consumption ratio to the university museum space also has a rank of 3 and 30% of frequency.

In the field of waste disposal, policies to reduce the use of paper and plastic in the university museum ranked 7th and 36.36% of frequency. The waste and waste recycling policies of the University Museum are also ranked 9th and 27.27%. The average frequency of waste disposal is 31.81%.

Scope of indicators	Average frequency percentage
Budget	33/01
Disposal of waste	81/31
Education and research	39/63
Electricity	30
Infrastructure	39/99
Renewable Resources	38/63
Sustainable Tourism	36/36
Water	45/45

Table 3 - Frequency of green management indicators in percentage

According to Table 3, the priority of the importance of the areas of green management indicators from the perspective of the research community is as follows; Water consumption, infrastructure, education and research, renewable resources, sustainable tourism, budget, waste disposal, and electricity consumption. This priority arrangement shows that the existence of appropriate infrastructure in university museums affects the coordination of the museum with the educational mission and, on the other hand, with the results of Cole, Lindsey, and Aktork (2020) research, which considers green facilities as an opportunity to coordinate the museum with the educational mission.

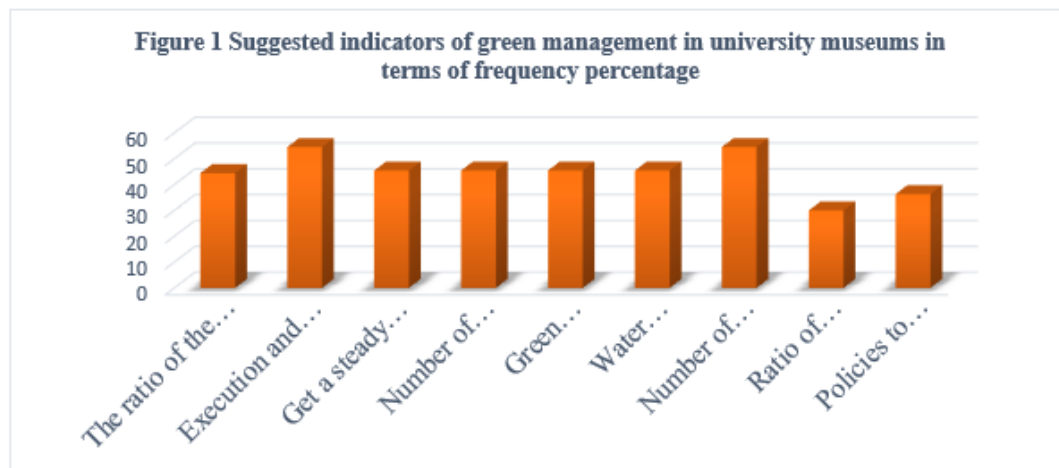
The importance of education and research also indicates the efforts of museums to educate the public about environmental protection, which emphasizes the results of Reelife (2016). The care of museums for the environment improves the environment and, on the other hand, is in line with the results of Dedeogluo (2020) research and emphasizes that green museums are an effective step in solving the problem of people and the environment.



The importance of sustainable tourism after the existence of infrastructure and education and research also shows the correct use of resources to create sustainable development in museums. In addition to raising awareness, university museums are a factor in the indicators of sustainable management in order to create sustainable development in society. This is in line with Ghorbani, Bab Al-Hawaiji, and Noushin Fard (2017).

Based on what has been mentioned, the important indicators of green management in university museums from the research community's perspective are as follows. Most of the indicators are ranked ten and the indicator of sustainable income from tourism in the university museum is ranked 9, the policies to reduce the use of paper and plastic in the university museum and the waste and waste recycling policies of the university museum are ranked seven and the ratio of electricity consumption to The space of the university museum was ranked third. This indicates that the goals of the university museums were in line with the creation of green museums.

University museums, in addition to the protective role of the university heritage, awareness, education and research and fostering new goals in sustainable educational development, emphasize preserving the university environment and preserving the national environment and in the green management of the university as the most important educational, scientific and Education plays an effective role in society. Therefore, the most important indicators of university museums in each field are shown in Figure 1.



According to Figure 1, the proposed indicators of green management in museums are as follows: the number of renewable energy sources inside the university museum, implementation of smart buildings, ratio of university museum budget to green management budget, receiving sustainable income from tourism in the university museum, Number of courses/courses related to environment and sustainability offered by the University Museum, reports on green management measures, water consumption management and wastewater disposal in the University Museum building, policies to reduce the use of paper and plastic

in the University Museum and consumption ratio Electricity to the university museum space. It also seems that the indicators studied by experts have similar priorities and are very close to each other.

In terms of generalizability of the results due to the use of green management indicators in Alzahra University as the main indicators in determining the proposed indicators of green management in the museums of the university, it can be said that the results of this study are generalizable and practical for Alzahra University. This research can be repeated for other universities according to the budget, infrastructure, and other areas.

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Behind the exhibit. A historical perspective on narratives in science and technology museums.

Abstract

Looking back at the roots of science and technology museums in national and international fairs can help to better understand the unresolved relationship of these museums with the environmental issues of today.

More than fifty years ago, Eugene S. Ferguson, the American engineer, historian of technology and museum curator, wrote a much-cited article in which he analysed the links of science and technology museums with world fairs, highlighting the difficulty of the museums in adopting a critical approach:



"In too many cases, technical museums continue to reflect, both in philosophy and practice, the international exhibitions that gave them birth. As long as technical museums are equated, by public and curator alike, with a permanent trade fair, so long will the museums continue to be immensely popular and largely vacuous. Their uncritical emphasis upon the superficial and spectacular and their failure even to suggest the unsolved problems posed by the 'progress' to which the whole show is dedicated can only add strength to the accelerating movement toward indiscriminating mechanization of man's environment."
(Ferguson, 1965)

The recent publication, *Behind the Exhibit. Exhibiting science and technology at world fairs and museums of the twentieth century* (Canadelli et al., 2019) offer many examples of the "exhibitionary complex," as Tony Bennet calls it, that has permeated these narratives up through the second half of the twentieth century and still challenges museums today.

The essays highlight how science and technology, variously related to the idea of history, played a great role in international fairs, and later in museums, in connection with the ideas of progress, civilization, identity, nation-state and education of the masses. If nineteenth-century international exhibitions celebrated the achievements of the Industrial Revolution, twentieth-century fairs mostly aimed to "shape the future" and define modernity amid a more conflicting and ideological political context, both during the Interwar period and in the second world post-war scenario marked by the Cold War and the Atomic and Space Age.

Today, in fact, we must admit that technical-scientific museums, as well as their younger brothers, the science centres, still run the risk of perpetuating the rhetoric of progress and civilization, the idea of science as a rational activity par excellence or, quite simply, the commercial interests of the industry, albeit in more subtle ways. Their traditional stakeholders-a mix of industry, research and public bodies-orientate public policies and discourse, with an increasing role in the education system. Consequently, the staff and audience composition of the museums still reflects an emphasis on communication and education rather than historical research or adult-oriented contextualization of contemporary controversial themes (Conn, 2006).

It is no coincidence that the publication *Behind the exhibit* belongs to a series titled "Artefacts: Studies in the History of Science and Technology," which has been bringing together an informal group of museum professionals and academics for over 25 years for discussions about the material culture of science and technology, as well as the challenges museums face in presenting science and technology to the public (<http://www.artefactsconsortium.org/>).



Natural history museums have a different story: they were born as part of the founding movement of the life sciences and were strongly linked to research, embracing active engagement in environmental issues since the 1970s. Eventually, these museums took a public stance on the Buffon declaration, thus recalling the central role of the collections and research in addressing the biodiversity crisis (Natural History Institutions and the Environmental Crisis, 2007).

Science and technology museums, on the other hand, have not yet managed to take a clear public position. They were originally meant as permanent amplifiers of "modernity" and today they are in the midst of the crisis of the modernist dream of planet control, still elaborating the end of the myth of Nature separated from society. This considerably slows down the practice of more critical approaches that are no longer just anthropocentric and celebratory of technology (Koster, 2016).

The question that we cannot longer avoid is: How can the science and technology museum, rooted in a nineteenth-century positivistic framework, deal with the environmental issues of the twenty-first century that are grounded on the radical subversion of that same framework?

If we are ready to accept as fact that industry and techno-scientific development represent the fulcrum of the environmental transformations of the last two centuries, the cause of the biodiversity crisis and the climate crisis, what does this mean for our museums?

Social studies of science and technology put this contradiction in more general terms, bringing out the controversial relationship between science, technology, the environment and sustainability. Technoscience is the cause of the environmental crisis-because it has enormously amplified the scope of human intervention on the environment-but it also controls and guides the knowledge and research of the crisis itself and is often referred to as the only solution.

Social scientists studying the environment wonder if it is possible to think of a different technoscience in the sense of a knowledge that is not automatically aimed at dominating the material world and extracting growing value. They also suggest a historical-critical approach to support the necessary change of narratives:

"It is important to show the way in which science and technology have developed, and to focus on the peculiar synergy established in economic, political and social relations historically, showing that these relations are far from being unchangeable; they do not constitute the only conceivable reality and we can promote a profound rethinking in this regard." (Pellizzoni, 2020).



Could this be a good suggestion for our museums today? Are we able to support and activate this rethinking in our museums?

Due to the historical reasons described, environmental history is still rarely recognized and practised by science and technology museums that tend to insist on featuring major exhibitions on the future and on global issues. Perhaps a good start could be to find alliances with the academy and the civil society, investing in research and public programmes on the environmental history of our own countries, focusing on the impact of industry on the environment of our territories and analysing case studies on the destruction of ecosystems and on the incidents and their impact on local population; representing the local history of social and cultural movements on environment and the evolution of the laws. This could also create an opportunity to better understand the role of our scientists and engineers in the environmental crisis, including their culture and their praxis.

Making history locally as a civil act can encourage a deeper understanding of the larger context and of the complexity of a highly divisive issue such as the climate crisis. Certainly, this work would encourage museum professionals to learn how to better handle general concepts such as «nature,» «culture,» "environment," "development" and "crisis."

The history of the environment is the history of a crisis: the crisis of modernity. Science and technology museums were born to celebrate modernity. We need to admit it, work on it, and overcome it.

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23- Das Zukunftsmuseum-Discussing Utopia and Dystopia of Future Technologies

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The Deutsches Museum with its branch museums is an outstanding place for the communication of scientific developments, technical education and for a constructive dialog between science and society. Founded in 1903, it is one of the most traditional and, with 66,000 m² of exhibition space, largest science and technology museums in the world. Its unique collection of original exhibits makes the Deutsches Museum a leading international location for technical and scientific culture. Since September 2021 the Deutsches Museum does have a new branch, the "Zukunftsmuseum". Right in the heart of the historical old town of Nuremberg, this branch expands the portfolio of the Deutsches Museum to aspects of "future technologies" in connection with ethical and social issues. (Fig. 1)

The Concept

For centuries, mankind has been trying to predict the future, be it by looking into a crystal ball, or today perhaps rather by foresight analyses, technology assessment or computer simulations. Even though the methods have become more scientific, the future remains uncertain even today - yet one thing has become clear, the one future does not exist.

For this reason, science today also speaks of futures, a multitude of possible developments in the future that may eventually take place. Since neither the development nor the time of what is to come can be clearly determined, the "Zukunftsmuseum" deliberately refrains from using clearly defined time horizons and thus creates space for the representation of the future as an undefined, formable space of possibility. In order to make the topic of the future, a difficult and also partly contradictory topic for a museum, tangible for the medium of the exhibition, a question directed towards the future was formulated as the basis for the conception of the exhibition - "Science or Fiction?".

This question not only makes the selection of exhibits to be presented more diverse, since visions from science fiction also find their place alongside prototypes from research laboratories, but it is also the starting point for the spatial design of the exhibition. This design literally creates a juxtaposition of science and fiction - the "science" side contains current innovations and prototypes from a wide variety of technological fields. At the same time, their modes of operation as well as technical and scientific fundamentals are conveyed here through demonstrations specially developed for this purpose. The scientific nature of the exhibition is also underlined by a cool, laboratory-like atmosphere in which the exhibits are arranged



in a clearly defined grid. The "Science" area is thus the part of the exhibition that combines classic museum aspects with science center elements. The "Fiction" side is directly opposite the "Science" side and forms the emotional complementary. Here the grid dissolves, the space becomes darker and more indefinable. Different, past and present, visions of the future, utopias and dystopias as well as hopes and fears can be found here and open the view to possible consequences in the future through the use of the technologies presented on the "Science" side. It is pop cultural elements (science fiction movies and books as well as art) that are the focus in the "fiction" area and convey the emotional side of the "future technologies" through visual, acoustic, haptic and olfactory impressions. (Fig. 2) This juxtaposition creates a unique field of tension with sometimes provocative questions and challenging interactive stations that encourage visitors to think. At the same time, however, the field of tension also offers the opportunity to take a stand, to develop or reconsider one's own points of view, and to discuss them together. The aim of the exhibition and the "Zukunftsmuseum" is to create a forum for an open civil dialogue on socially and ethically relevant questions about the future in relation to technological developments and thus to embed technological development in social discourse. In doing so, the natural sciences, humanities and social sciences stand side by side on an equal footing. The presentation of the future as a "shapable space of possibility", the importance and limits of science, research and development for this process, and the need to find new social consensuses in the course of new technological developments are central messages of the exhibition.

The Exhibition

Five thematic areas contextualize "future technologies" - technologies that are highly likely to have an impact on tomorrow's lives. The five thematic areas span from the personal environment, with "Work & Daily Life" and "Body & Mind", to the extended living environment, with "System City" and "System Earth", to the large-scale perspective, with "Space & Time", the conquest of outer space and the understanding of the universe.

"Work & Daily Life" takes visitors into the multifaceted world of digitization and shows the latest developments that are designed to make our lives easier and more convenient thanks to data and networking. In addition to topics such as the Internet, big data and social media, visitors will encounter robots, artificial intelligence and the latest gadgets from the Internet of Things. Despite all the hopes and prophecies of work relief through these developments, the first signs of possible risks for the future can already be seen today. In addition to the loss of gainful employment to robots, the uncontrolled collection of our private data poses the risk of surveillance, control and, as a consequence, human control. In order to effectively counter these threat scenarios, important decisions are needed at the societal level: What influence should machines be allowed to have and where should humans retain control? (Fig. 3)



In "Body & Mind," visitors are taken on a quest for eternal life. Along the way, they find devices that help people live healthier lives and make personalized non-invasive diagnoses. 3D-printed organs, prosthetics that restore and enhance senses and abilities, and implants that store memories and merge the mind with the computer. These developments help humans overcome aging and disease, and perhaps even influence evolution to create the improved human to the point of transcendence. The desire for healing and liberation from physical suffering and related limitations seems to eclipse the danger of losing what is human. But who decides which life is worth living, which abilities are desirable, and where the boundary between human and machine is? Ethical principles about the question "What and when is man?" should not be discussed only when technology has already created the new man. (Fig. 4)

What will the city of the future look like, sound like and function like? That's what visitors experience in "System City". Green and intelligent urban development concepts are enlivened by architectural marvels, flying cars and smart energy distribution. They show solutions to traffic and environmental problems in ever larger and more complex cities. At the same time, a look back makes it clear that urban development can rarely be controlled or decided. The city as a living system follows complex mechanisms that need to be understood and expanded in an integrative way. How and where cities need development must be negotiated in dialogue with the people who live there. (Fig. 5)

In "System Earth," visitors will find technical solutions that can halt climate change or feed a growing world population. They see vertical farms and underwater greenhouses, experience how energy can be generated from the sun, moon and stars, filter CO₂ from the air, and avoid waste through new materials. Nevertheless, technology is not the only solution, and the price to be paid for its use is not foreseeable. We need to weigh up together to what extent we should intervene in the Earth's self-regulating system and whether there are perhaps other possible solutions. Because in the end it affects the entire planet and all of humanity, even if only one person makes the decision. (Fig. 6)

In "Space & Time," visitors are taken on a journey into the infinite expanses. They learn more about the different ways of getting into space, life in space, on the moon and Mars, and traveling to infinity. In the process, it becomes clear again and again how inhospitable and dangerous life in space and on other planets is for humans and what technical solutions we need to overcome this. The question arises, what are we actually looking for out there and why? And what is the significance of outer space for the Earth? Questions that have so far been asked in small circles, but which should urgently be discussed more broadly and made public. (Fig. 7)

In all thematic areas, visitors experience the surprising and the unexpected; a visit to the museum becomes a voyage of discovery into the future. At the same time, visitors are confronted at all points with utopias and dystopias that belong to the technologies and are invited to make decisions and to shape their own



future, to find and rethink points of view and to discuss them with others. Thus, the museum becomes a very special place for a social dialogue about ethical dimensions of technology and science.

The Game

A game was developed to encourage visitors to consider the various possible utopias and dystopias and to enter into discussion with each other. In it, visitors can create their own future; all they have to do is collect various technologies that they can find throughout the exhibition. A total of twenty different technologies from all thematic areas are available to visitors. From the abundance of technologies, visitors can choose five technologies to create their own future. In the game, the visitor puts these five technologies into a time machine and sees what utopian and dystopian effects the technologies can have in the future. In parallel, however, the utopias and dystopias are also shown when these technologies are not used. This makes it clear that even the decision not to use any of the future technologies is a decision and can have consequences both good and bad. (Fig. 8)

Here is an example of one of the future technologies, the ecovative mushroom packaging - a new material that is supposed to revolutionize packaging, as it can be returned %100 to the biological cycle, because it is edible:

The visitor decides to take the ecovative mushroom packaging into his future on the twenty technologies collected in the exhibition and his hope is fulfilled, he lives in a future without packaging waste. Any packaging can be immediately recycled as animal feed. This would kill two birds with one stone, because on the one hand there would be no waste and on the other hand the animal feed problem would be solved. On the other hand, there is the fear that the use of this new technology will increase people's wastefulness, since everything is recyclable and thus more waste is produced than the animals are able to recycle. And so the mountains of garbage would still grow, even if they are compostable. But what would be if one would simply not use this new material? In the best case, humans would simply change their behavior and live a packing-free life. However, if this change in behavior cannot be implemented, then we will find ourselves in the same dilemma as we are already facing today: the littering of our planet. (Fig. 10 + 9)

The visitor receives the results of his decisions in the "Forum", the heart of the museum. This is not only the starting and ending point of every visit to the exhibition areas, but also the place where visitors can actively discuss with each other the consequences of using the technologies of the future.

Discussing future with citizens

Every decision of the visitors is saved and displayed in a statistic, visible for everyone, in the "Forum". The decisions of the last 24 hours as well as the decisions of the whole month or year can be displayed. In this way, the museum as well



as the visitor gets an insight into the decisions of the visitors and it shows which technologies are particularly popular with the visitors. Changes as well as trends can be shown and displayed - which gives the museum, as well as research and industry, the possibility to define priorities regarding future technologies from the society. (Fig. 12 + 11)

At the same time, the statistics serve as an introduction to moderated discussions, which are open to everyone and take place in the "Forum". Based on the statistics as well as the utopias and dystopias, individual technologies are discussed together with the visitors- what hopes and fears they associate with the use of the technologies, what problems there might be from a social, political, economic or even ethical point of view, what it means if this technology is not used and what framework conditions are needed so that the technology is used in the way we, as a society, would like it to be. In this way, the "Forum" of the "Zukunftsmuseum" becomes a place for an open civil dialogue on socially and ethically relevant questions about the future in relation to technological developments.



Fig. 3 - View insight the Exhibition



Fig.1 - Deutsches Museum Nuremberg



Fig. 2 - Collaborativ Robot by KUKA

24- Museums and Environmental Education: Insights of Turkish Museums

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Abstract

Environmental education is a process that allows individuals to explore environmental issues, engage in problem solving, and take action to improve the environment. Individuals develop a deeper understanding of environmental issues and have the skills to make informed and responsible decisions. The aim of environmental education is clearly to show the economic, social, political and ecological interdependence of the modern world, in which decisions and actions by different countries can have international repercussions. Environmental education should, in this regard, help to develop a sense of responsibility and solidarity among countries and regions as the foundation for a new international order which will guarantee the conservation and improvement of the environment. In 21st century museums have started to study and research on agriculture and environment to emphasize natural heritage, and organized various exhibitions and events. Natural history museums were the pioneers in environmental education and in 70s ethnographical museums and ecomuseum models took care on this process. The green museum approaches, environmental education workshops, sustainability sessions and community science activities have been scheduled in several museums around the world. In this study the natural history museums, open air living museums, science centers, digital and temporary biodiversity exhibitions, neighbourhood museums, ethnographical village museums and various archaeoparks are determined with their educational activities. In Museum Education concepts are the balance of the nature, natural environment, limited resources and ecological footprint, global environmental problems, friendly environmental solutions and sustainability. Study includes the facilities of the Ministry of Education and the Ministry of Culture and Tourism through their collaboration in museum education and concerns the special environment lesson which is accepted by the Board of Education.

Keywords: Museum, Museum Education, Environmental Education, sustainability, natural history museum.

Introduction

Developing countries face many unique challenges that affect the environment, including in economics, in postcolonial development and poor governance structures, in responses to global climate change, and in impoverished educational structure (Kremer et al. 2013). Environmental education is playing the key role to solve one of these unique challenges in the context of environmental



problems. Environmental education is a process that allows individuals to explore environmental issues, engage in problem solving, and take action to improve the environment. Individuals develop a deeper understanding of environmental issues and have the skills to make informed and responsible decisions.

Environmental education is education about the environment, for the environment, and in the environment that promotes an understanding of, rich and active experience in, and an appreciation for the dynamic interactions of,

- the Earth's physical and biological systems;
- the dependency of our social and economic systems on these natural systems;
- the scientific and human dimensions of environmental issues;
- the positive and negative consequences, both intended and unintended, of the interactions between humancreated and natural systems (Acting Today, Shaping Tomorrow, 6 :2009).

There is no universal model for the implementation of environmental education. Although there is overall agreement on principles and supporting concepts, specific goals and processes must be defined locally to meet the differing environmental, social, and economic conditions in the countries. Environmental education should be considered in a community-centred context. For this context the implementation of environmental education should be locally relevant; culturally appropriate. It should enhance understanding that local issues often have provincial, national, and global consequences. It should build the capacity for community-based decision making and environmental stewardship. It should support lifelong learning.

Environmental education is also a discipline that tries to find new methodologies and tools to advance in the achievement of its goals. The museum education proposed by several museums types, because of its specific methods and power of significance, can be a way forward for environmental education that is worth exploring. The theory of meaningful learning can be used by both disciplines to support and achieve more meaningful, and therefore lasting, learning among people. The complementarity and synergy between these disciplines can be established from their points of conceptual coincidence (Hein, 1998).

Museums are suitable environments for learning (Hein, 2012; Burnham and Kai-Kee). According to Hooper Greenhill (2006:238), museums promote interactivity and hands-on contact with museum objects. That experience is quite experiential and affective. Education in the museum is visitor centered and it encourages active information searches on the museum objects by visitors. Hooper Greenhill states that the museum should act as a learning facilitator, furnishing users with information (Hooper Greenhill, 118-2005:114). It promotes local-based and universal learning. It adapts to each personal experience and cognitive structure, and promote critical thinking (Moreno, 2002:182). It adapts to the diversity of the public (Karadeniz, 2018:24). Environmental education overlaps with museum education in many ways. It promotes learner's active involvement in learning process, and experiential education and it promotes education in environmental



values through museums. In several museums, visitors are learning actively when they do such things as: formulate their own questions about works of art, reflect on their own ideas and impressions, make their own discerning judgments, construct their own interpretations, and seek their own personal connections. That is why, the museum education is a specialized field devoted to developing and strengthening the education role of non-formal education spaces and institutions such as museums. Its main objective is to engage visitors in learning experiences to enhance their curiosity and interest in their objects and collections.

The educational role of museums are identified as the core to museums' service to the public in the American Alliance of Museums's Excellence and Equity Report (2008). Excellence and Equity: Education and the Public Dimension of Museums is the first major report on the educational role of museums ever to be issued by the American Association of Museums. Excellence and Equity presents an expanded definition of museums' educational role that involves the entire museum—from trustees to guards in the galleries, from public relations staff to docents who give tours, from curators to educators.

According to report;

- 1.** The commitment to education as central to museum's public service must be clearly expressed in every museum's mission and pivotal to every museum's activities.

- 2.** Museums must become more inclusive places that welcome diverse audiences, but first they should reflect our society's pluralism in every aspect of their operations and programs.

- 3.** Dynamic, forceful leadership from individuals, institutions, and organizations within and outside in the museum community is the key to fulfilling museums' potential for public service in the coming century.

Nature museums, natural history museums and centers, botanical gardens and. Are founded in most developed countries promote science, culture, education, and conservation. These centers are responsible for; exploring the diversity of the fauna, flora, and human ethnography via collections and scientific researches that include morphology and genetics. They also protect the environment and promote responsible interaction between people and the environment. They use the knowledge gained, as well as books, databases, and collections, to promote science Education. They aim to develop and increase respect for ourselves, for our fellow human beings (regardless of background), and for all living creatures and our shared Earth. They use research results in areas such as history, culture, permaculture, and biological control to nurture sustainable communities (Qumsiyeh et al, 102 :2014). Those museums are effective centers for environmental education activities. Regarding the natural environment, Yuqin (2008:21), attributes the natural history museums an important role in the promotion of sustainable development. In her view these museums have to be "a driving force in the protection of local biodiversity" because "a museum not only conserves specimens of extinct animals, but it is also a guardian or defender



of the biological and cultural diversity of living creatures" (Yuqin, 2008:22). Also, due to their educative function, through the exhibitions they organize, museums can promote and attract attention on "the vital importance of harmony between humanity and its natural environment" (Yuqin, 2008:26).

Those museums and centers are used as facility centers for a number of educational projects for local schools and universities. They reach out to isolated and underprivileged communities to improve interactive science education. In Turkey natural history museums, arboretums, botanical gardens, science centres, forest museums, ecomuseums and etc. are considered as environmental education centers. Ali Demirsoy Natural History Museum (Erzincan), Emirler Archaeological Site and City Forest Museum (Mersin), Ege University Natural History Museum (İzmir), Natural History Museum of İhsan Ketin (İstanbul), MTA Natural History Museum (Ankara), Burdur Natural History Museum (Burdur) are the pipner examples in environmental Education activities.

Ali Demirsoy Natural History Museum is a museum in Kemaliye, Erzincan. The museum is in the campus of Hacı Ali Akın Multi-Program Highschool in Kemaliye district, of Erzincan Province. Its founder is Professor Ali Demirsoy of Hacettepe University. It is supported by TUBITAK (Scientific and Technological Research Council of Turkey). Primary and secondary school students visit the museum in the context of national curriculum and their courses in science and environment education. Museum is also a partner of several European Union research projects. Museum develops informal and formal learning activities through its collection. The collection includes natural history items as various minerals and rocks, single cell plants and animals (shown under microscope), some invertebrates, Herbarium and insects on panels, fishes in alcohol, amphibians in alcohol, venomous snakes and other reptiles in formaldehyde and alcohol, birds in formaldehyde and alcohol and examples of stuffed mamalia such as bear, volf, wildcat, marten, mountain goat, badger, squirrel, rodents etc. native to area and Herbarium of more than half of all plants native to Kemaliye area.

Emirler Archaeological Site and City Forest Museum is a small museum located in Mersin Province, southern Turkey, exhibiting archaeological artifacts found at site and some fauna of the city forest. The Ministry of Forestry decided to establish a picnic area in the southern slopes of Toros Mountains where Mersin is in the view. During the construction, some archaeological remains were unearthed. In the same area Ministry of Forestry established a forestry museum in a wooden cottage. In the museum, insects, butterflies and birds of the forest are displayed. There is also a 5 kilometres (3.1 miles) walking track. That museum is visited by local schools and researchers.

University museums and collections are also the centers for environmental education. Natural History Museum of Ege University is a university museum in İzmir. The museum is in the campus of the Ege University next to Faculty of Science. The museum was founded in 1973. There are 400 items in the exhibition. There are 6 halls in 2,500 square metres area. Exhibiting items are classified as



paleontology, rocks and minerals, birds, Turkish fauna, general zoology, osteology and evolution. Museum is principally open to university students, academicians and researchers. Primary and secondary school students often visit to museum for museum education. İhsan Ketin Natural History Museum is a museum within the Mining Engineering Faculty of İstanbul Technical University. The museum was named after Turkish geologist İhsan Ketin (1895-1914). The exhibited items in the collections are Darwin 2000 Beagle series, İstanbul invertebrate fossils, Zonguldak fossil flora, Solnhofen fossil fauna and Aegean Region plants and fishes. It is also visited by the researchers and primary and secondary school students for related courses.

MTA Natural History Museum, which hosts millions of years of history of nature and humanity opened its doors to the visitors for the first time in 1968 in Ankara. Turkey's first natural history museum with international standards, MTA Natural History Museum today has a very rich collection in parallel with the researcher identity of general directorate of mineral research and exploration. Animal and plant species, fossil, mineral, rock and mineral samples from Turkey and various parts of the world are exhibited in the museum, as well as all kinds of energy sources and forms of energy in the Energy Park under the same body of the campus. Museum had an education unit. The Education Unit opened in 2012, in order to make an efficient trip in our Museum. Contribution to the contemporary education is aimed for visitors. In the Education unit, children have the opportunity to study the selected objects from the exhibition, and they are able to examine plant and animal fossils, minerals and archaeological remains from different units of the museum. Museum has a training room for 16 people. In this room children learn with the educational materials prepared for different age groups. On the ground floor, there is a small model of the museum for visually impaired visitors. The labels written in braille alphabet and audio about natural history help visitors to have knowledge on specimens and the museum. In this section there are casts of fossils and animals, footprints of man which is one of the masterpieces at the museum, prehistoric stone tools and old mining equipments. And also by the small statues of the Baluchitherium (the largest land mammal that ever existed) and dinosaurs such as Brachiosaurus, Allosaurus and Stegosaurus, visitors will have an idea of the life in the past. Temporary exhibitions were held on Konya, Niğde, Adana, Kayseri at visually impaired schools in 2016-2015. Museum took a part in EU projects, national researches with universities and projects of TUBITAK. Museum conducts national and international projects on Paleogene Fossils, Stratigraphy And Paleogeography of Turkey, Archaeogeology of the Ancient Gemstones, Development and Application of Energy Technologies, Historical Development of Mining in Anatolia, Gemstone Potential of Turkey and Museum Preliminary Studies. These projects are also turn into educational activities for secondary and high school students. MTA Natural History Museum prepared a teaching kit for preschool students and teachers, dinosaurs information and painting books, museum guide book, elephants information and painting



books. Museum had the collaboration with Department of Ankara University Interdisciplinary Museum Education Unit to develop curriculum programmes and teacher's training activities.



Picture 1. Teaching kit for preschool students and teachers, dinosaurs information and painting books, museum guide book, elephants information and painting books.



Pictures 2 and 3. Education Unit and Main Gallery

There is another natural history museum opened in Burdur in 19th century old Orthodox church. After a preservation and restoration activities museum was opened as one of the most important state natural museum of Turkey. Museum contains fossils which roamed the region over 2 million years ago.



Pictures 4 and 5. Burdur Natural History Museum

Arboretums are also covers several botanical gardens in Turkey. They contain living collections of woody plants and conduct scientific studies. Arboretum Island (İstanbul), Atatürk Arboretum (İstanbul), Karaca Arboretum (Yalova) and Konya Tropical Butterfly Garden are among them. The Tropical Butterfly Garden was built in 2015 by the Municipality of Selçuklu next to the Flower Garden and the Adventure Tower inside the Butterfly Valley Park, one of the biggest urban parks in Konya. Garden prepares garden and nature courses.

The nature education program is significant for the Konya Tropical Butterfly Garden in terms of their commitment to reach out to children and overcome nature love. Garden's nature education department constantly renews itself to improve their programs in an educational way. Course are "With Interesting Creatures, Explore The Colorful World of Bugs, Introduction With Reptiles, Bird Workshop, Fungal Workshop and Scientist Workshop". Garden courses include butterflies, bees, ladybugs, mantises, dragon flies and phasmidas (ghost bugs)



Picture 6. Konya Tropical Butterfly Garden



Picture 7. Butterfly Unit, Konya Tropical Butterfly Garden

Tropical Butterfly Garden has an insect museum. Interactive presentations about the same time as the kind of insect museum visitors take place in the life of the butterfly life cycle of butterflies and other insects and will be exhibited for the classification, documentary and cartoon representation expecting a mini movie theaters.

Turkey is quite rich with Science and technology centers. Science and technology centers are as out-of-the-school learning environments are as important as formal education in raising children in line with the expectations of the society and in achieving educational goals. Turkey has more than 20 science and technology centers. Konya, Kocaeli, Bursa, Ankara, Kayseri, Gaziantep, Elâzığ, Eskişehir, İstanbul, İzmir and etc. biggest industrial cities of Turkey has science and technology centers. They aim to support innovative, potentially transformative, complex research and education projects that require large-scale, long-term awards. They try to contribute to society is the creation of new knowledge. Science and technology centres in Turkey are supported by TUBITAK to make several collaborations with NGOs and institutions.

Temporary Biodiversity Museum was opened in 2016 in Antalya During EXPO 2016. The aim of the museum is emphasizing the importance of the future of agriculture in Turkey through 3D digital narrations and visuals. Digital galleries



also told the story of biodiversity in Turkey and indicated the future projections.



Picture 8. Gubretas Biodiversity Museum, Antalya EXPO

Besides the museums and centers which are mentioned above, there are several eco museums, village museums and city museums which keep on organizing environmental educational activities. Baksı Museum was established in a small provincial centre, 864 km far away from Ankara, the capital of Turkey. To build a museum and a research centre on a quite modest hill of a hill range looking at the Çoruh valley, 5 km far away from a village called Bayraktar, old name Baksı, was most desired by the Painter Prof. Hüsamettin Koçan, who was born in this village. Museum has both permanent and temporary contemporary art collections. Museum aims to support the development of women, young people and children in the region and to contribute to education, occupation and employment. To this end, weaving workshops were set up beside the museum. In addition to this activity museum also organizes art workshops and environmental explorations in the local area (<http://baksi.org/en/etkinlikler>). Kenan Yavuz Ethnography Museum which was built in an area of 8000 m² in Bayburt Province, Demirözü District, Beşpınar Village, has been built in integration with all the structures in the relationship of time and space, the texture and architectural structure of the region. The stones and wood used were collected from destroyed houses and mountains in the surrounding villages. Within the museum; Village House, Water Mill, Bezir Oil Mill, Amphitheater and Open Air Cinema, Village Square, Dede Korkut Turkish Identity Library, Masjid, Tandoori, Permanent Çinimaçın Exhibition Area, Indoor Exhibition Halls, Open Exhibition Areas, Swing, Bayburt Pigeon Bird House, It consists of Ashane, Gecekondu and Konak (<https://www.kenanyavuzetnografyamuzesi.org/en/muzemiz/our-story/>). Museum also aims to continue traditional cultural and environmental education. Museum prepared a book named "Flowers of My Village". Çoruh River and Valley Project is also conducted by the museum. A similar museum was opened in 2016 in Ankara as Beypazarı Living Village. Aim of the Museum is sustaining the local culture and developing organic agriculture. Weekend workshops supply

environmental education. Museum contains Eco Museum Market, Overnight Activities, Turkish Cousine Specials, Camping – Hiking – Adventure Activities. Environmental problems were handled for the first time in the Five-Year Development Plan in Turkey (1977-1973). In this plan, water, sea, air, soil pollution and erosion, noise and recreation places are included. In 1991, the Ministry of Environment was established (Today Ministry of Forestry, Ministry of Environment and Urbanization). The special environment lesson is accepted by the Board of Education and this course was applied in 1993-1992 (Elective Environment and Science course). Environmental education is significant issue for the future of Education because of the environmental sustainability for the region.

Conclusion

Traditional museology includes collecting, preservation, documentation, storing and exhibition as classical functions in the 19th century. In 20th century research and communication were added as modern functions. Contemporary museums continue the collecting, preserving, documenting, storing, researching and communicating but they also added education, participation, sustainability and digitalization as interactive functions.

Museums were accepted as the special factors on effecting developing the cultural heritage in 70s in Europe. In England and France to declare those factors natural heritage was also considered as a heritage type so, that became a subject of the museums. In 70s museums started to study and research on agriculture and environment to emphasize natural heritage, and organized various exhibitions and events. Natural history museums were the pioneers in environmental education and then ethnographical museums and eco-museum models took care on this process. Museums also started to play a great role in sustainable development through educational purposes. The sustainable development of any region depends on the sustainability and measures taken by all the public and private organizations in the respective area. Museums stand out among these organizations due to the controversies arising in connection with the role they have to play in this process of sustainable development. According to the definition given by ICOM in 2013, the purpose for which any museum operates is to serve the development of the society by acquiring, conserving, researching, communicating and exhibiting "the tangible and intangible evidence o people and their environment". Also, one of the basic functions of a museum is to preserve the cultural resources of a community not only for the current generation, but also for the future generations. Through their function of conservation and preservation of the patrimony in time, museums contribute to assuring the sustainability of both the cultural and the natural environments. The importance given to environmental education is increasing at primary, secondary, high school and university levels in Turkey. This education should be designed as a practical and nature-identical education rather than theoretical education, not only in schools but also in out-of-school learning environments. It



is important to recognize, protect and develop the environment in a progressive and sustainable manner by using the possibilities of technology. Museums, nature parks, science centers, natural monuments, villages, ancient settlements, etc. out-of-school learning environments should be handled in the context of total environmental Education. Examples of practical training should be embedded in school programs. In addition, the public should be encouraged to participate in environmental education activities in their immediate surroundings, and museums should especially participate in «citizen science activities».

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25- A New Look at Traditional Methods for Rehabilitation, Revitalization and Sustainable Tourism at the Har Forest Heritage Site

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A collaboration between:



With support from:



1. Introduction

Sarzurzuma, is the name of a reef in the mangrove forest of Hara. The reef is ecologically vital for this portion of the forest, protecting it from severe weather and waves. It is also home to several local plant and bird species. Sarzurzuma is



also a vital economic source for the community of the village. The community takes tourists to this location for daily visits and overnight stays and tourism is one of the most important sources of income for the village. Unfortunately, due to global warming and disturbance by boats, the reef is eroding. In the last two years due to the pandemic, the number of tourists visiting the village has been extremely reduced but we predict that many tourists will visit the island and the forest post pandemic, which will increase the risk of environmental damage.

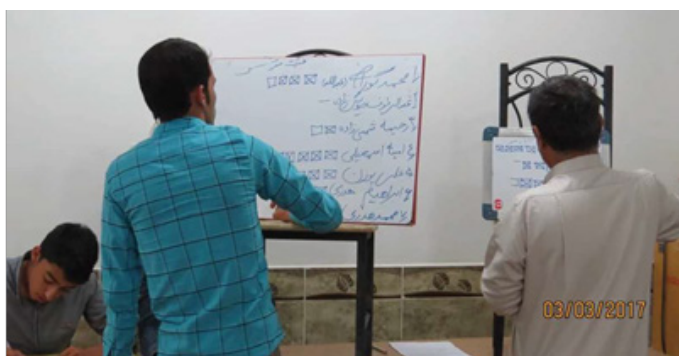
Gouron village Cooperative and volunteers from Gouron, in collaboration with consultants from Studio Chahar are looking at applying natural and man-made strategies for slowing down erosion along the shoreline. We are also introducing a new type of sustainable eco-tourism for Sarzurzuma and designing new pavilion structures as refuge spaces for the tourists, inspired by local crafts and boat-building techniques. Through extensive research and by looking at other Mangrove forests, we have found several erosion control strategies to try and apply in our local shoreline. As erosion control strategies, we want to use tree pruning, and planting, placing loose shell bags and wood-fencing on the shoreline. Our goal is to create a living shoreline, control erosion and look at the possibility of using similar strategies for erosion control in other reefs of Hara. Currently we have started the second stage of installations as it will be explained in the article.



2. Gouron Rural Development Cooperative Company

The people of Gouron village are famous for their skills in building, maintaining and overhauling various types of traditional wooden vessels as well as making international voyages by traditional sailing. JICA provided support in technical expertise for tourism, landscape and community development and finance at 41,153\$ for the pilot project in Gouron. In 2015, Qeshm Free Zone Organization (QFZO) started a project titled "the Project for Community-based Sustainable Development Master Plan of Qeshm Island toward Eco-Island" in cooperation with the Japan International Cooperation Agency (JICA) including support of the historical village of Gouron.

The pilot project was completed in September 2018 and all the ownership was transferred to the Gouron Cooperative, the local company that was formed as the next step. Gouron cooperative is a rural company with 99 community members from the village of Gouron. Gouron Rural Cooperative is actively creating opportunities for sustainable tourism by focusing on Gouron's natural, historic and cultural attractions and is working on preserving the revitalizing these sites.



Gouron Cooperative Meetings





Traditional Fishing Moshta



Chakavir Canyon



UNESCO Registered world heritage: Traditional skills of building and sailing Iranian Lenj boats

3. UNESCO Registered Biosphere Reserve - Hara Mangrove Forest *Avicennia* mangrove ecosystem - Sarzurzuma Barrier Reef

The sand reef of Sarzurzuma, is part of Hara Mangrove forest, a UNESCO registered Biosphere Reserve located between Qeshm Island and the Persian Gulf. Situated in the Mehran River delta, it hosts the largest *Avicennia* mangrove along the Persian Gulf shoreline and, therefore, represents a center of biodiversity in Iran¹, house to numerous species of plants, birds and insects.

The area includes 40 villages. The local population are engaged mainly in trading, although. other activities include palm plantations, animal husbandry, fishing activities and ship construction. The lack of freshwater supply and salty water intrusions prevent agricultural activities close to the shoreline.

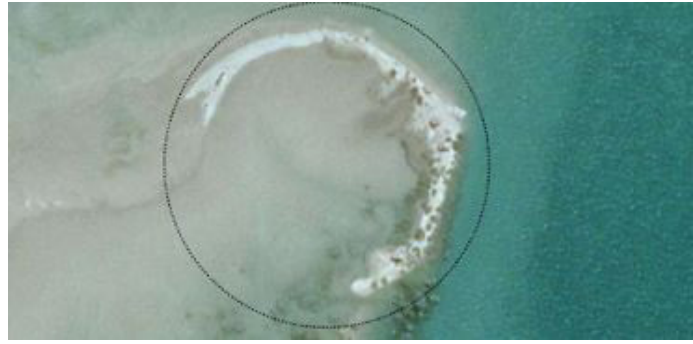
Other problems that face the biosphere reserve include the development plan for Qeshm Island, logging activities for fuel wood by locals in the mangrove forest, overgrazing, and illegal hunting and fishing.

The reef of Sarzurzuma is one of several reefs in Hara forest that by their strategic formation, support the growth of the forest and stabilize it. The highest elevated part of the reef has historically, always stayed dry, acting as a barrier against high-power waves. In local dialect, Sarzurzuma means the point where the forceful waves meet from different direction and get neutralized, showing the depth of local knowledge on how the environmental systems in their particular geography, sustain their ecosystem.





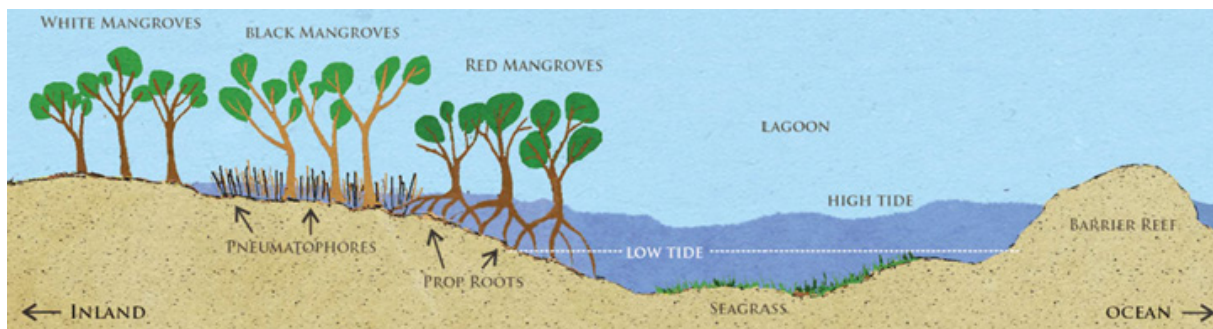
UNESCO REGISTERED Biosphere Reserve- Hara Mangrove Forest



The reef of Sarzurzuma in the mangrove forest of Hara.

Avicenna Mangrove Ecosystem

The diagram bellow shows how a barrier reef in a Mangrove zone is vital for the growth of the forest3• The sea/ocean water calms down as it meets the barrier, creating a safe ground for the mangrove ecosystem to thrive.



SITE VISIT - SARZURZUMA REEF- Avicennia mangrove ecosystem



4. Erosion Time Line- Sarzurzuma Reef

The images bellow show how Sarzurzuma reef has been eroding, moving and shrinking over the past thirteen years, threatening Hara trees. The erosion is mainly caused by fast movement of boats near the reef and rising sea levels.



The yellow color shows where the reef was 13 years ago, and the white color shows its status in 2019. The difference shows how the reef has been shrinking and moving.

Our goal is to find strategies to reverse, slow down and alleviate the erosion effects and create a plan for sustainable tourism.



5. Traditional Strategies for Erosion Control and Hara Mangrove Rehabilitation - Planting and Pruning

Several local strategies have been previously used by the local community as they were using the forest on a daily basis, and as a result, protected the trees. These strategies are used less in recent years, due social and economic factors and change of occupation. Our goal is to identify ways to educate the community and younger generations about their own techniques and encouraging them to protect their environment.

Local Strategy: Pruning

Pruning Hara plants traditionally has helped with the growth of new plants, distributing the seeds, and strengthening the pruned tree. After Hara tree pruning, the leaves are used for grazing. Unfortunately, due to overgrazing, pruning was completely banned for several years which led the locals do not prune the trees anymore and also forget the right methods of pruning. A plan for controlled pruning through educational workshops about the right methodology of pruning and its benefits can solve this problem.

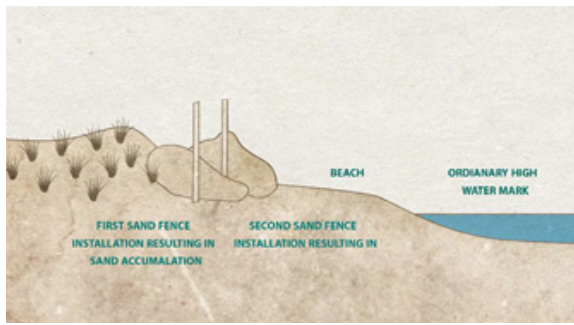
-Planting new Hara trees: The roots of the Hara plants play a vital role in stabilizing the sand. By planting new Hara trees in strategic locations, the reef can be restored. Also, more plants mean that the forest can become more stable.

6. New Traditional Strategy: Beach Fencing

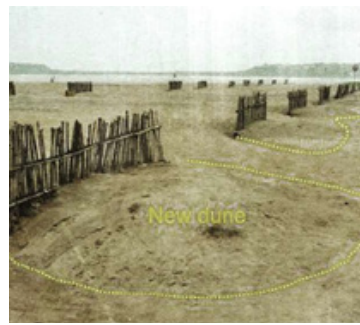


Building beach fences in designated areas helps rebuild sand dunes behind the fence/wooden structures. This strategy is economically viable because we can use recycled wood from old boats to build the fences and the fences are easy to build. It also has minimum environmental hazards because we only use organic materials for the fences. We are also looking to use the wood from Pakistani Kahours for the fences to help get rid of this hostile plant species and put its wood into good use.

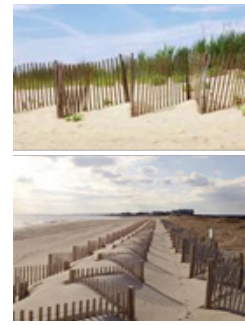




Sand Dune Stabilization



Beach-fencing Examples



Moshta, traditional beach fencing

Through our conversation with the local fishermen, we found out that they have observed accumulation of sand around Moshta structures over time. Moshtas are built with wood poles connected with woven fabrics. This finding from the local traditional knowledge is a reassurance that wood fencing can help us rebuild the reef and we can design the fencing as a Moshta.



Traditional Moshta, used for fishing

7. Other Possible Strategies - living shorelines Recreating Organic Artificial Reefs

Strategic placement of plants, stone, sand fill and other structural or organic materials, and/or artificially simulated shapes can help in the stabilization of the shoreline.

"Living shoreline treatments do not include structures that sever the natural processes and connections between uplands and aquatic areas. The approach can employ plants, sand, oyster shell (often in bags), organic materials (e.g., biologs made of jutte), concrete (castles) material-filled structures (OysterBLKs™) or other recycled or natural structural materials (e.g., fossil shell, granite, concrete)."



7-Examples of organic and artificial man-made shorelines

8. Prototyping and Testing, Jan 2020

In January 2020, we planted 100 new Hara trees, setup a series of wood fencing, and did some early prototyping for Sarzurzuma pavilions, with volunteers from Gouron Cooperative, Studio Chahar and visitors. The pictures below show the process of installation.



In January 2021, we added a new portion to the wood fencing, with volunteers from Gouron cooperative and visitors



The yellow outline in the image below shows the portion of the fencing that is already installed and the Hara plants that are planted. The black lines show the fences that we need to install in the next steps along with the trees that will be planted.



9. Next steps for erosion control:

1. Sarzurzuma workshops

In the next phases of this project, we are planning to have more community workshops for brainstorming and ideation with the youth, women, men and all stakeholders of the project. These images show two workshops that we held in Jan 2020.



In the next phases of this project, we are planning to have more community workshops for brainstorming and ideation with the youth, women, men and all stakeholders of the project. These images show two workshops that we held in Jan 2020.



We are also planning for guided educational workshops for tourists/architecture students/locals in which the participants will help in the installation process of the wood fencing, organic shell bags and planting/pruning of Hara trees.



2. Artificial Reef Development

Another area of our exploration is to investigate possibilities for creating an artificial shoreline, using locally available resources. Lime-based products have historically played a significant role in architectural interventions of the region. Lime is a sustainable material and offers a great potential for the developing an artificial reef.



8-Artificial shoreline

3. Re-routing Motor Boats

By adding signage for reducing boats speed and defining boat paths further from the reef, we can slow down the damage that are caused by boats. We plan to have educational workshops for the community to get their help for this matter.



9-Speed control signage

10. Ecotourism Opportunity: Sarzurzuma Pavilions

Sarzurzuma reef is a well-known tourist destination, and is used on a regular basis by the locals as a destination for leisure and for guided tours/stays, and is also one of the income generating destinations for local tour guides. The environmental sensitivity of the mangrove ecosystem requires a managed plan for tourism in which the environmental damage can be minimized. Currently most of the pavilions that are built for the tourist are not offering enough protection and some of the ones that are more permanent, have used concrete in their structure which is detrimental for the setting. By designing and building pavilions that can work with the ecosystem and offer enough protection, both the environment and the economy can thrive.

In the village communities of Hormozgan, women start weaving from a young age and turn all the found pieces of the abundant palm trees to usable artifacts. The more brittle parts of the palm skin and the leaves are woven as mats and



baskets, and the stronger portions of the skin are extracted as strips and woven as ropes, knitting fishing nets and waterproofing elements for the locally built wooden ocean liners. These artifacts are shaped, transformed and refined in exchange between distinct geographical locations and cultures, through the historic water route of the Strait, travelling through India and East Africa.

The initial design of the refuge pavilions is taking its cues from local palm weaving techniques and the structure takes advantage of the local boat-building craftsmanship. The vaults face south, letting the sun in the space in winter and keeping it shaded in summer. The base takes its form from the roots of mangrove trees, stabilizing the sand beneath and evenly distributing the weight of the pavilion, to help in absorbing the sand.

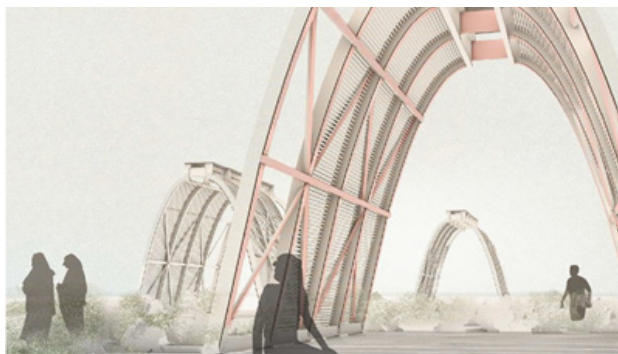


We are planning to install seven new pavilions within two phases and design a wooden walkway and boat access wharf to minimize foot traffic on the reef and use the structure of the walkway and the pavilions for sand stabilization. Even though, ideally, keeping all foot traffic away from the site would be the best, since the site is already a popular destination and used a lot by local visitors and tourists, we believe that creating useful and ecologically sustainable infrastructure will help us preserve and revitalize this site.

The new refuge pavilions will tell a tale of the historic sea voyages and will leave the touch of the community on a vanishing shoreline, by stabilizing the sand and slowing down erosion through their footings. The skin of the pavilions will be designed with the help of local weavers and painted through workshops with the students.

Each pavilion's structure will represent a city along the historic route and will be built by local craftsmen and boat builders. The palm, once a seed, then a tree, then a woven wicker, becomes an element of refugee pavilions that we will make and paint. Craft, as a catalytic process, is aimed to build a momentum in revitalizing forgotten histories, preserving vanishing identities and connecting diverse cultures.







Endnotes

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26- Environmental Education in Museums : A Hybrid Approach

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Abstract

Environmental issues and climate changes impact everyone, everywhere and all aspects of life. Though environmental awareness in formal educational settings is quite a common practice now-a-days, however, museums in non-formal educational settings have also undertaken activities programs related to the environment protection & awareness. Science museums have been regularly organizing programs like nature study camps, popular talks, Nature Photography, Investigative Projects involving students, celebration of commemorative days like World Environment Day to increase the level of awareness about the environment among the public and particularly among the students.

It may be noted that most of the programs conducted by the museums are in-house, conducted inside the museums or in-person, conducted in presence of the participants. However, during the pandemic, it is a challenge now to conduct the programs in-house or conduct them in-person as most of the museums are closed or even when they open up, we have to maintain covid appropriate behavior for the visiting public to the museums. Museums have already transformed some of their in-house programs into online mode . As the museums opens up gradually for visitation, its time to

shift to the hybrid model. Birla Industrial & Technological Museum at Kolkata, India has successfully transformed a number of its activities including programmes on environmental education into online mode in the last one year during the pandemic situation. However, some programs were also conducted in-house by inviting a select group of students and conducted following social distancing norms. This hybrid model approach opened up new vistas for the museum and also increased the inclusiveness, resulting in a holistic environmental education and awareness.

Keywords: Environment, Pandemic, Hybrid mode, Awareness

Introduction

We always expect our museum to have such an environment where galleries will be buzzing with visitors who are interacting with the exhibits and moving through different galleries. Family visitors, students enjoying the atmosphere and gallery demonstrators satisfying their queries. But from early last year, the scenario has totally changed. The Covid-19 crisis changed the face of the museum. The pandemic profoundly affected societies around



the world and museum sector has been one of the most affected. Museums have been hit like anything, with nearly 95 percent of them worldwide, having closed their doors during the crisis as per ICOM first survey in April May 2020. The closure of the vast majority of the world museum was an exceptional event and had considerable economic consequences with a very large number of museum largely dependent on the income generated by the visitors. Apart from revenue generation, for a museum which has shut down temporarily, the toughest job is to see that its support base, the support of its stakeholders, the general public, the student community, teachers is not eroded. The institutions risk losing visitors, institutional members and the goodwill of the local community during a temporary shutdown.

The impact of these closures was not only economic, but also social. Museums play a vital role in our societies. but also provide spaces that promote education, inspirations and dialogue. Based on values of respect and cultural diversity, museums strengthen social cohesion, foster creativity and are conveyors of collective memory.

However with coordinated actions, museums transformed many of its activities, including ongoing exhibitions, programmes, and outreach activities, to a digital mode and then some to a hybrid mode so as to cater to the visitors and the student community.

4 Crisis period for the Museums

Museums play a vital role in our societies. They provide spaces that promote education, inspiration and dialogue. As a museum professional we always expect them to be buzzing

with activity. But from early last year the scenario has totally changed. Closed doors and museum closure notices hanging in front of museums. As you all know starting from early last year, the Covid-19 crisis has profoundly affected societies around the world and the museums sector has been one of the most affected. Museums have been particularly affected by the Covid-19 pandemic, with nearly %95 of them having closed their doors during the crisis (Fig.1).

But this is not the first-time museums have been confronted with a situation like this. In 1918 the Spanish Flu pandemic infected over 500 million people worldwide and led to fifty million deaths. At that time also the museums and other public places had to be shut down and closed for public. Museums were converted to temporary isolation centres. and some were even converted into emergency hospitals.

The closure of the museums now during the pandemic period poised a number of challenges for the museum.

1. How to remain relevant when the museum will be closed for the visitors.
2. How to generate income in absence of absolutely nil visitation to the museum.
3. How to address the requirements of the student community in particular and other stakeholders during the closure period.
4. Optimum and fruitful use of in-house resources for development of new programmes, activities which would cater to the visitors and help



them when the museum is closed for in person visitation.

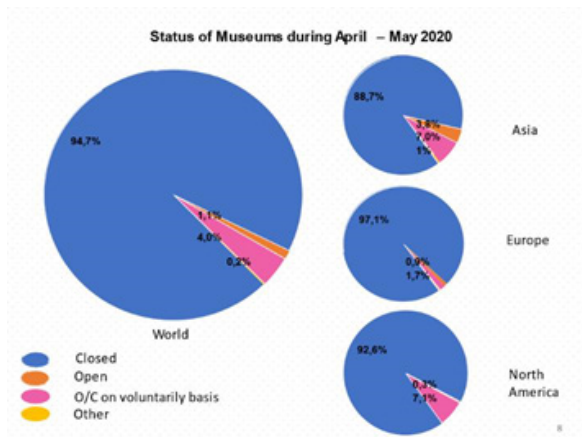


Figure 1 : Status of Museums during April – May 2020

Source : ICOM report

Response from the Museums

Faced with these challenges, how did the museums respond to this situation. I would say the response of the museums has been fast and rapid. With coordinated actions, museums transformed many of its activities, including ongoing exhibitions, programmes, and outreach activities, to a digital mode so as to cater to its visitors and the student community. As soon as the restrictions were partially lifted last year, Birla Industrial & technological Museum (BITM) started its online activities and programmes immediately. The first live online programme was the 'Observation of Super Moon' which was organized as early as on April 7th, 2020 with a live Q & A session. Astronomy based programmes has always been a favourite amongst the visitors, so we got a good visitors response. Few months back we also observed the Moon Landing Day with an online

demo with models titled, 'Miraculous Moon'. So astronomy and particularly observation of celestial events is one area where science centres can arrange online activities to be shown live to the visitors.

The summer camps organized by BITM is a much-awaited event every year. Seats gets filled up immediately after the ad comes out. However, last year and also this year was different and we had to conduct the camps online.

BITM conducted Online Summer Camps on Mathematricks, Physics, Geography & Basic Astronomy and Make your first Android App, Electronics for the Beginners', Introduction to Arduino, Virtual Robotics etc. Similar to the in-person camps, there was no dearth of enthusiasm amongst the students for the online camps and as such we had to organize the camps in three spells. They were paid programmes, so that was a source of revenue for us. However, the main idea was, that our museum should continue to organise all those regular programmes, particularly for the students, which were in much demand when times were normal.

BITM hosted a number of online popular lectures. We had lectures on Mathematics, on microgravity, on digital fabrication, on alien life etc. This type of talks can be easily arranged with both the speaker and listeners being at remote location. The talks can easily be webcast in Facebook, You tube, having the option of visitors interacting with speaker. The good thing is that you can reach out to new audiences who could not have visited the museum because of logistic reasons. However, all the programmes conducted above

were in online mode with nil visitation to the museum.

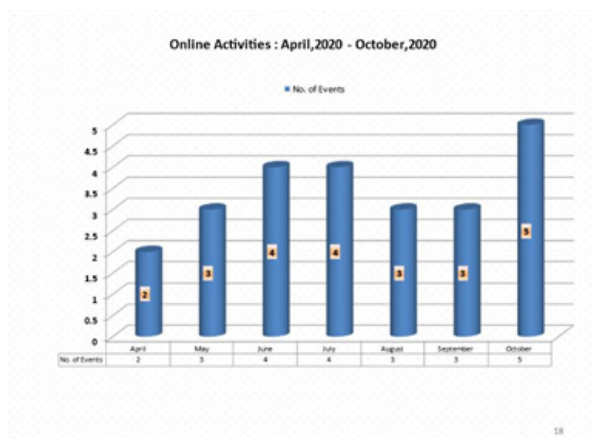


Figure 2 : Online Activities in BITM during April to October 2020

As the situation improved over the course of time the museum opened up for visitation, but with certain restrictions. Visitors started to come in gradually to the museum and normal activities and programmes for the visitors started. However, since there were some restrictions already in place the visitor's attendance in various programmes and activities were regulated. For example, shows which had a capacity of say 100 visitors were now required to be conducted with only 50 visitors. Similarly, the programmes and activities for the students were also regulated in similar fashion.

Shifting to a Hybrid mode

However, the idea of shifting our programmes and activities to a hybrid mode came from organizing an activity related to an astronomical event. This astronomical event was the partial solar eclipse which could be observed from India last year. In this programme, we arranged for observation of the partial solar eclipse in the campus of our museum. However, due to restrictions

we regulated the number of the visitors who came for observation of the partial solar eclipse. But we did not want to deprive other interested people who could not come to the museum because of vehicular restrictions and movement restrictions. We wanted them to get an opportunity to view the eclipse live. For this we arranged webcast of the partial solar eclipse through our YouTube channel. We got very good reviews after organizing this programme both through in-person visitation and live webcast through our YouTube channel. This hybrid mode of the presentation of the programme helped us to reach a large number of interested and enthusiastic public. We could also reach a number of segments of the population starting from general public to students, to the astronomy enthusiasts, to the teachers and also to a large segment of the public, who could not or might not have visited the museum at all.

This particular mode of hybrid presentation of this astronomy programme encouraged us to develop further such programmes following this same mode i.e., partial in-person and partial digital approach.

Environmental issues and climate changes affects everyone, everywhere and all aspects of life. Though environmental awareness in formal education setting is a common normal practice now a days. However, museum in non formal settings have also undertaken activities / programmes related to the environment protection and awareness. Museums have been regularly organizing programmes like Nature Study Camp, Popular Talks, Nature photography, investigating projects, celebration of commemorative



days like World Environment Day, to increase the level of awareness about the environment among the public and particularly among the students.

It may be noted that most the programmes conducted by the museum are mostly in house, conducted inside the museum or in person and conducted in presence of the participants. However, during the pandemic it is a challenge now to conduct the programmes in house or conducted them in person as most of the museums have to maintain covid appropriate behavior for the visiting public to the museum. For this situation, museums need to shift to a hybrid model for conducting such environment awareness programme. Museums will now have to transform some of their in-house programme into online mode or to hybrid mode. Some examples of hybrid model of environmental programmes which could be adopted by other museums also is given below.

Taking the hybrid mode for Environmental education Nature trail or nature walks is such a programme which can be conducted in hybrid mode with the actual trail being conducted outdoor and major part of the in-house activity in the museum , like project reports, worksheets, presentation etc. can be done by the participation at home and can also be later shared live through software's, like google class room or presentation through google meet.

Environmental awareness workshop on a number of topics such as soil fertility, air and water quality, biodiversity, Environmental awareness workshop on a number of topics such as soil fertility, air and water quality, biodiversity,

water recycling etc. can be organized in hybrid mode. The participants to these camps will participate both in-person and virtually i.e. participants in the camp will always be with the programme and shall always be in contact with the programme. Participants have the option to participate in a hybrid learning model, where they will come to the museum for part of their weekly allotted time, then supplement it with at-home activities. To maintain safety during the pandemic, the participants adhere to new protocols like checking temperatures and wearing masks.

One necessary goal of the hybrid program was reducing the number of participants together in the museum. Those restrictions have pushed software like Google Classroom or Zoom, allowing supervisors ways to meet with the participants and monitor their progress. To bridge the in-person and virtual experiences, supervisors is having the virtual participants show up remotely at the same time as the in person participants. That way, they can still interact. The scheduled meeting times also add a bit of structure and encourage participants to keep up their participation. In some groups, in-person participants are paired up with remote partners so that they can continue to collaborate on projects. To bring out creativity of the students , the museums can also organise to bring out panel exhibitions on different contemporary environmental topics such as Global warming, Natural Calamities etc. Using simple virtual tools, students can collect picture, matter on the topic and could design sections of the exhibition online. Once



the matter and visuals are created, they may be suitably designed by the museum and fine-tuned. Thereafter the exhibition may be put on display at the museum for the visitors to see it. In recent years there has been an explosion in the availability of apps for smartphones that can be used to help with plant identification in the field. There are a number of approaches available, ranging from those apps that identify plants automatically based on the use of Artificial Intelligence (AI) and automated Image Recognition, through those that require the user to use traditional dichotomous keys or multi-access keys, to those that may only have a range of images without a clear system for identification of any species of interest. A number of free apps such as plant net, seek, google lens, plant id etc are available free for use. Such kind of apps helps in conducting a number of interesting programmes through hybrid mode. One such programme could be identifications and mapping of trees and plants of the museum or a park, school etc. Participants could use the app and use it for identification of the plant. Thereafter the test results could be shared with other participants online to prepare the list of plants available in that area.

Studies show that the places where people feel most comfortable are open air environments like public parks and zoos, where distance can be maintained, and fresh air is plentiful. In art museums, natural history museums and even in science museums touching has been discouraged during the pandemic times. So, museums have to re-think about their outdoor spaces to

provide safety and fresh air while still engaging visitors and communities with rich content and programmes. Could we re-think about the use of the outdoors and deploy different systems to transform these spaces on short notice for exhibits, film screenings, lectures, and live performances. Parallely these programmes could be shown live in face book / you tube or social media platforms. This will definitely give the programmes a new dimension.

Film shows on environment during premiers or film festival is yet another programme which can be conducted in a hybrid mode. Because of restrictions, it will not be possible to fill up the theatre or auditorium to the full capacity. In that case a section of the audience can watch the same film show live in their computers or mobile phones.

Conclusion

The fundamental characteristics of museums is 'Resilience' and this has become even more evident since the beginning of the COVID19- crisis. Museums have always been able to reinvent themselves and adapt to changes in society. Museums are already rethinking their operations and their relationship with the public in order to move forward and survive post Covid -19. The hybrid model approach could be one such way ahead. This model has opened up new visitors for the museum and has also increased the inclusiveness, resulting in a holistic environmental education and awareness. However, each region, each type of museum will have to make their own assessment and identify the areas that will enable them to adapt to a new reality and new challenges.



27- Together, to the World Resque!

Asal Shakeri

Multidisciplinary Experience Designer & Educator | New York-Tehran

Politicians, major powers and organizations from all around the world once again gathered at COP26, to share concerns about climate change and to discuss future plans and promises for our planet EARTH. While they try to accomplish their goals through long term bureaucratic means, it's time for us – the People – to bring immediate actions and awareness by social means for a better future for all.

It's time to panic! It's time to believe and act like our house is on fire, like our life is at risk by a pandemic, like we are under attack in a war, like there is no future for our children; because there is none for everyone if we continue to live irresponsibly as individuals, communities and countries.

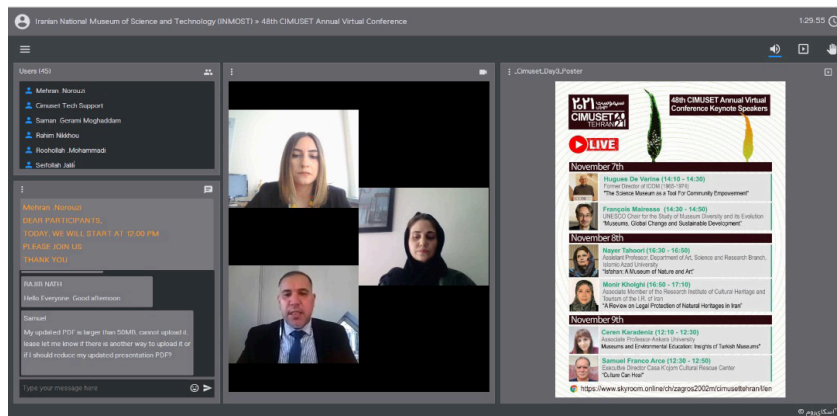
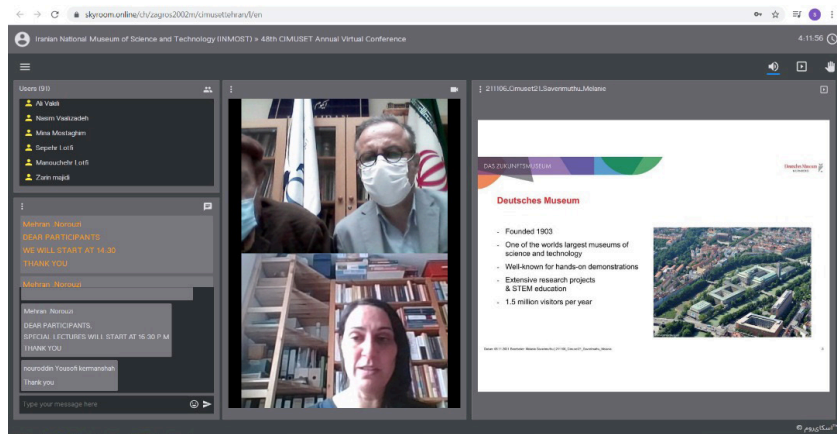
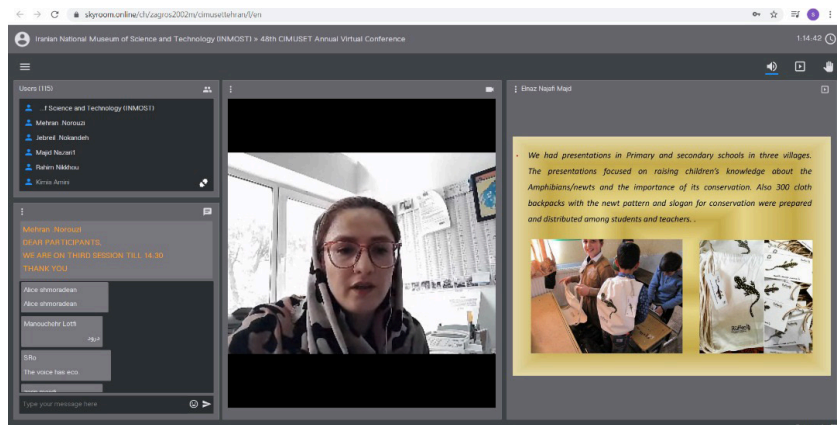
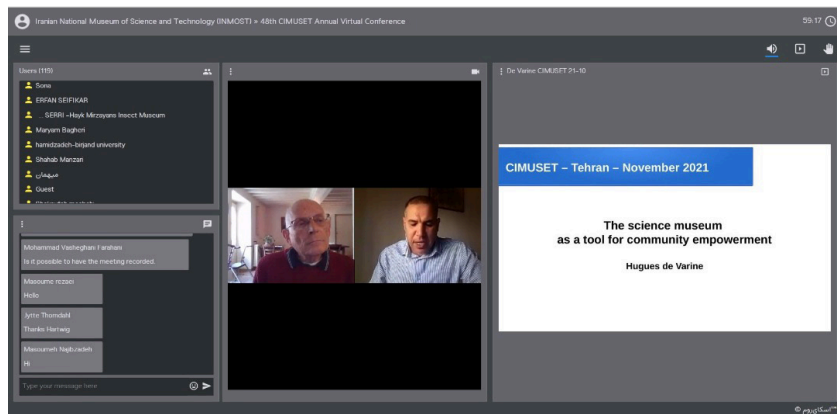
Every major movement started with individuals and people, by educating themselves and others, by creating new habits, trends and lifestyle, by raising awareness in large and detailed ways to help others understand the urgency of an issue and take action by taking small steps. It's time to ask ourselves how we should act and impact in such situations like there is no tomorrow. We need to start by asking ourselves what is our own footprint, our own role in living sustainably. In order to influence and engage others to create change, we need to believe the urgency of the situation and to live every step of our everyday lives accordingly.

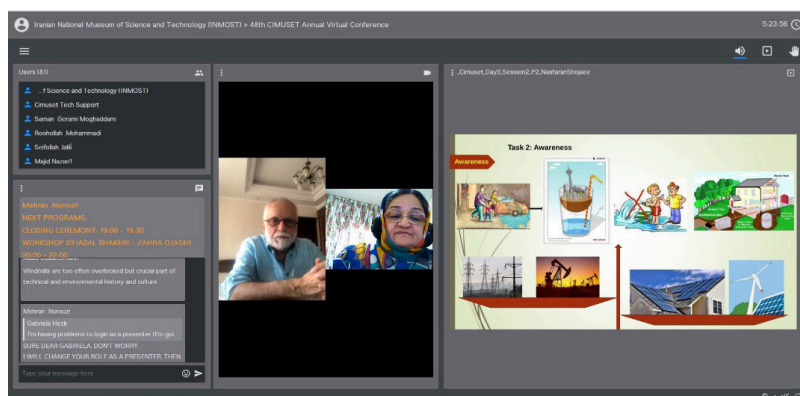
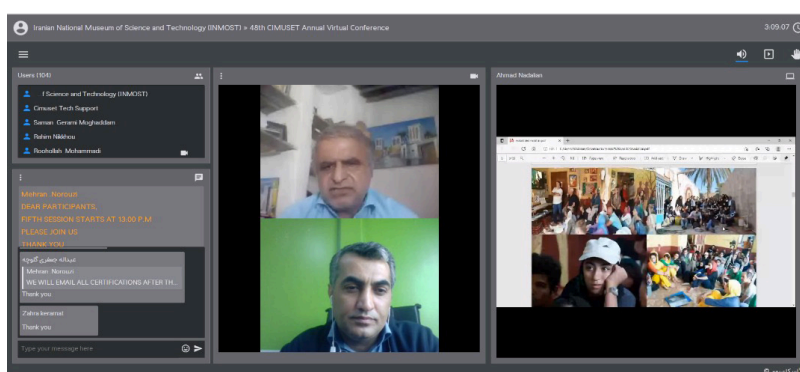
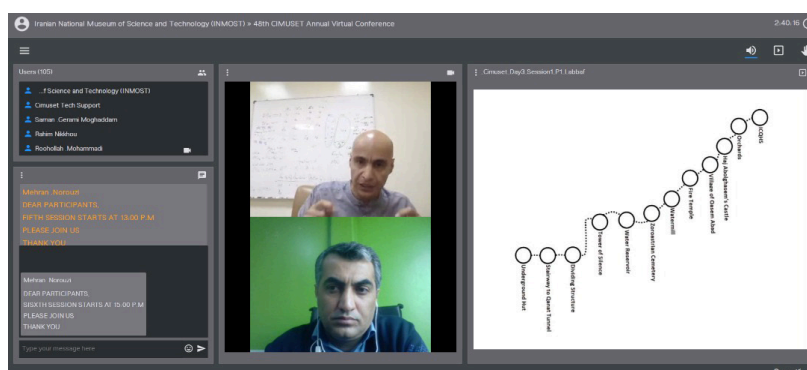
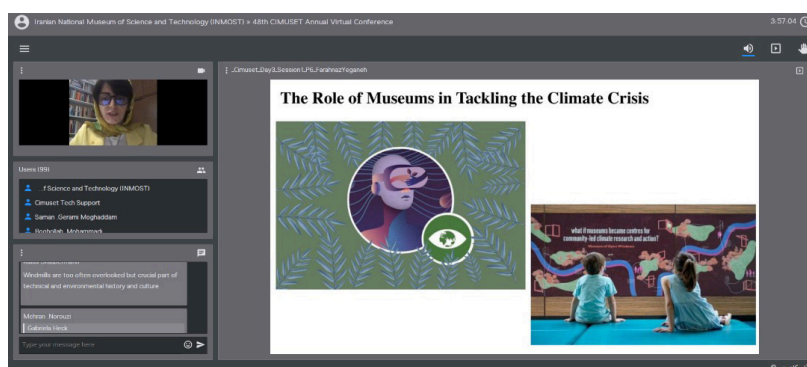
If we haven't already, it's time to start now from our homes, offices and our communities!

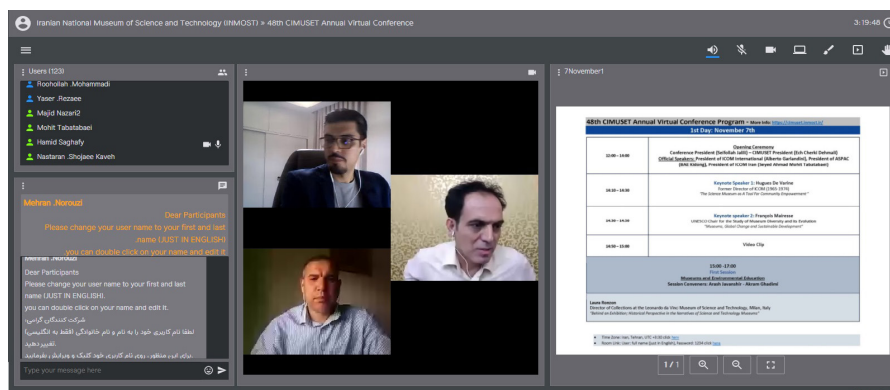
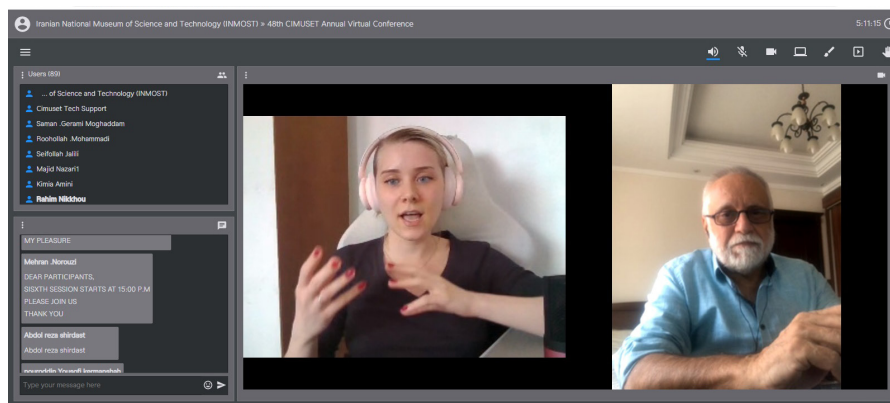
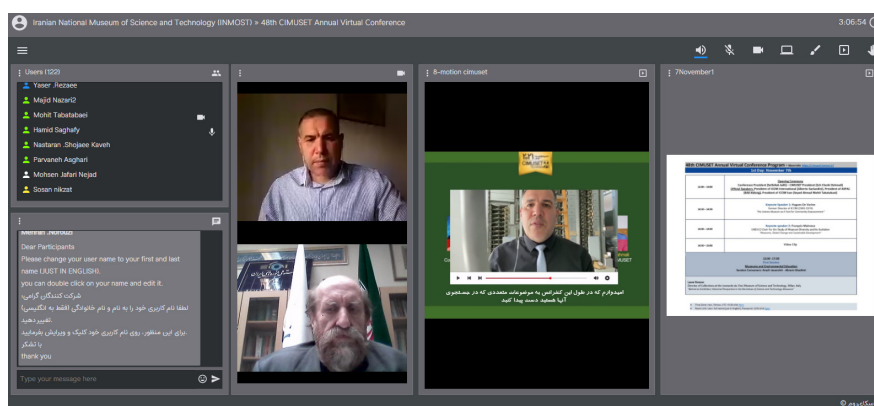
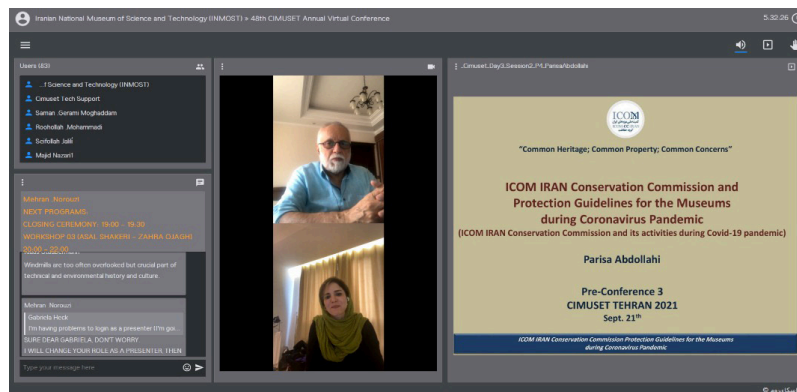
What we stand for—our planet EARTH— is what we stand on. As thinkers, designers, educators, researchers, scientists, architects and more importantly responsible citizens of the world, we can educate, inform, inspire, engage, create, communicate and collaborate to ask questions and to provide solutions to save our EARTH and LIVES. Science museums in collaboration with other educational-cultural institutions and museums, have the best potential, platforms and tools to reach out to a broad audience and bring attention to the matter through different direct and indirect exhibitions and experiences. They can educate and engage a wide range of audience to start conversations and take actions. Their target audience, the children and youth, are the vulnerable targets of the global climate change disaster; the generation who would suffer the most in the future if we don't act now. The generation who already stood up for their rights and their future. As professionals with tools and platforms, we can not fail them and our EARTH.

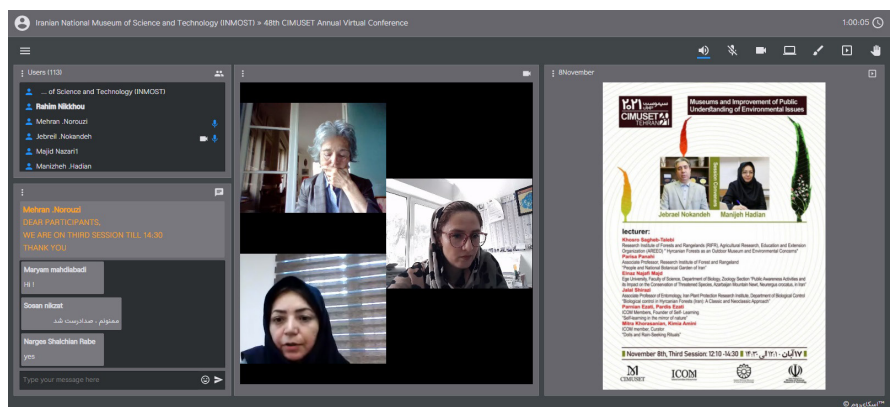
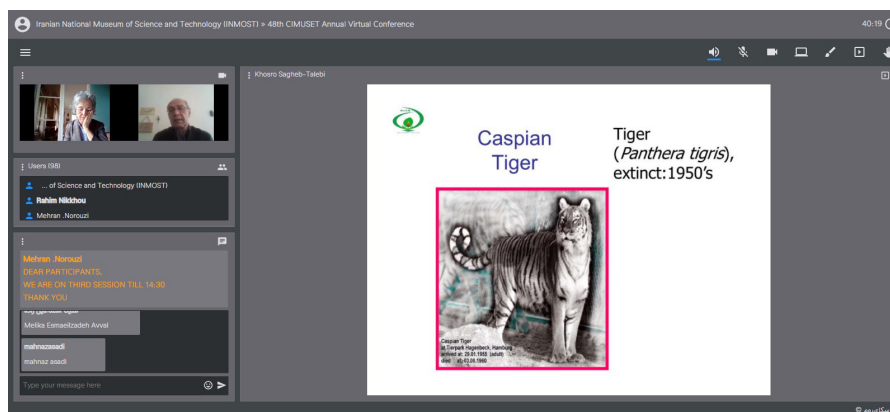
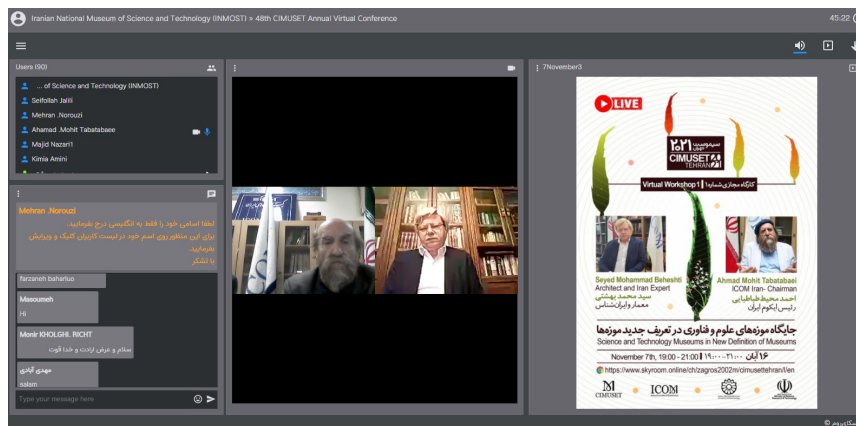
Who we are, where we are and what we do, together we should all act to the world Resque!













Mahlagha Mallah

(September 1917 - November 2021)

"Mother of Iran's environment"

Iranian environmental activist

Founder Womens Society Against Environmental Pollution.



