

Visitors' Knowledge, Awareness, and Perception (KAP) of Climate Change in Mashar National Park, Hail-Saudi Arabia

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Received: 3 August 2022 | Revised: 22 August 2022 | Accepted: 28 August 2022

Abstract-This paper assesses the Knowledge, Awareness, and Perception (KAP) of Climate Change among the visitors of Mashar National Park, Hail, Saudi Arabia. Empirically, it has been established that climate change has an impact not only on the cultural and natural heritage but also on the visitor traffic patterns in national parks. The objectives guiding the study center on the identification of the level of knowledge and the investigation of the perception of park visitors regarding climate change. In the Hail Region, which is in the Kingdom of Saudi Arabia's north central region, the average temperature ranges from 39°F to 103°F and is infrequently lower than 31°F or higher than 108°F. This KAP research adopted quantitative methods using a questionnaire survey for data collection. A total of 120 park visitors were purposively sampled for the study. It was concluded that the visitors in Al-Mashar Park are not fully prepared to mitigate the impact of climate change even though Hail is undoubtedly experiencing climate variability. According to the study's findings, recommendations were made to maintain the park and provide opportunities for managing the park in a way that would allow it to better adapt to the effects of climate change, maintain effective resource management, and improve tourist satisfaction.

Keywords-climate change; knowledge; park visitors; perception

I. INTRODUCTION

Climate change is a phenomenon that has been identified by numerous academic fields and authorities. The Intergovernmental Panel on Climate Change, defined climate change as a shift in the condition of the climate that may be identified and measured by changes in the mean and/or variation of its parameters [1]. Extreme weather conditions, including those related to temperature, wind, rainfall, and humidity, may come from climate change, which has been ongoing for decades [2]. Variable consequences of climate change affect the environment, human health, agriculture, and transport. Climate change has resulted, among others, in heat waves and wildfires. According to [3], climate change refers to changes in the typical meteorological occurrences as well as their extremes, timing, and spatial distribution that express as

hot or chilly, dry or moist, snowfall or winds, floods, or thunderstorm tracks, and increasing temperatures, as well as water currents or upwelling. Climate change is a proven tendency toward extremes in the global climate, independent of underlying reason [3]. As a result, in order to discuss climate crisis, the indicators in issue must be quantifiable and show extreme behavior, i.e. a trend that deviates from the usual.

Extreme Temperatures (ETs) have a negative influence on socioeconomic events and human health in Middle Eastern countries [4]. With regard to local climate change, Saudi Arabia, the largest nation in the Middle East, has seen a number of ET occurrences and their aftereffects. For instance, on June 22, 2010, Jeddah city experienced summertime high of 52°C [5]. Several communities lost power as a result of the country's 8 power stations being forced to shut down due to the high temperature. Due to the tremendous negative effects of ETs, it is crucial for every region and nation to conduct thorough investigations of temperature extremes utilizing current records. This is crucial for Saudi Arabia, in which the semiarid and arid environment is dominant [6]. The two basic factors that trigger climate change are aspects related to biogeography, such as natural forces and factors that are caused by human activity, or anthropogenic influences.

Climate changes may result from human actions that lessen the amount of carbon that is absorbed from the atmosphere [7]. Deforestation, farming methods, and other detrimental changes in land use are a few examples of these actions. Growing population, rapid urbanization, and the lack of land use planning, in addition to the effects of changing temperatures, precipitation, wind, and solar radiation, continue to contribute to the degradation of the environment and water supplies [8]. In addition, industrialization, gas flaring, and forest burning contribute to the release of significant quantities of greenhouse gases into the atmosphere, which contributes to climate change. Researchers have cautioned that changes in climatic factors could affect the ability of mountain tributaries to store snow and ice. The shift in seasonality could impede agricultural

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development, including future hydrological installation planning and operation [9].

Parks and protected areas are a germane context to investigate the perceptions of climate change because some visitors interact with climate-influenced resources and often notice climate-related biophysical impacts [9, 10]. Conversely, many impacts (e.g. increased temperatures, decreased water in the soil, species migration) from a changing climate remain relatively unnoticeable in heavily developed metropolitan areas where the 80% of U.S. citizens reside [11]. Therefore, parks and other nature-based areas provide unique opportunities to experience, notice, and respond to climate change impacts, which are perhaps much less apparent in the metropolitan built environment. National parks' ecological and cultural resources, as well as visitor patterns, will surely be impacted by climate change. With further global warming, it's conceivable that the places, times, and the number of people who visit parks will change. For instance, visitors may avoid the hottest months in low-latitude parks, whereas the season for visiting northern parks may last for several extra weeks or months. Several environmental and social elements will determine whether park visitors monitor climate change and alter their behavior. However, a crucial first step for park management and surrounding communities to predict, plan for, and actively influence future attendance is recognizing likely change in visits based on past records and anticipated trends of change in temperature [12].

According to a UN Habitat report, cities cover 2% of the earth's surface — yet, as hubs of social and economic activity, they consume about 78% of the world's energy. And cities produce, on average, more than 60% of the CO₂ emissions and greenhouse gases that give rise to global warming and climate change. Clearly however, the impact of climate change affects urban and rural dwellers alike — and Saudi Arabia has been experiencing it for at least during the last decade. With dry climatic conditions, its ecosystems are sensitive, water resources are limited, and agricultural fields are vulnerable to environmental transitions. The 2007 Intergovernmental Panel on Climate Change report showed that climate change has caused worldwide changes in precipitation levels, and that these have manifested in Saudi Arabia as increased levels of rainfall. In the major cities of the country, this increased rainfall, coupled with the presence of unplanned settlements, has led to increased hazards such as flash floods [13]. The physical infrastructure, natural ecosystem, cultural resources, visitor experience, and other intrinsic values of parks are at risk from the effects of climate change [14]. Impacts from localized changes in climate may influence the quality of visitors' experience and, therefore, visitors' perceptions of climate change are a concern for resource professionals who manage nature-based leisure services [15, 16].

Several studies show that climate related factors are important considerations for visitors making travel related decisions [17-21]. For example, it was found that certain climate variables, such as rain, storms, and higher humidity are likely to negatively influence travel decisions, in addition to higher temperatures alone, which are not always perceived as negative. Similar researches [20, 21] all found that seasonality,

extreme weather events, and annual climate variability impact visitor decisions. Further, increased temperatures and changes in precipitation impact recreation opportunities and particularly the activities highly reliant on weather conditions [22, 23].

Further, visitor experiences can also be impacted by climatic condition changes that result in loss or relocation of native species, introduction of invasive species, alteration of vegetation patterns, reduced availability of water, and increase in the frequency, severity, and size of wildfires [24]. According to [25], climate change is modifying species distribution, which makes conservation efforts more challenging. According to [16], measurable plant and animal responses to recent climate change within national parks have already been documented. As such, the management may need to alter practices and policies regarding allowable activities to accommodate changing species distributions and invasive species. In addition, the frequency and intensity of extreme weather events can impact the park resources and animal habitats [26-28].

The public's knowledge, understanding, and perception of climate change must be assessed in order to successfully implement sustainable environmental practices. The KAP strategy of this study is therefore very helpful. KAP research techniques are used to discover what people understand, believe, and act regarding a specific topic [29]. In light of this, research was conducted to determine the KAP of park visitors in Mashar National Park regarding climate change.

II. AIMS AND OBJECTIVES

The dominant rationale behind this KAP survey is to address the gaps in climate change knowledge, awareness and perception among park visitors in Al-Mashar National Park. This would be achieved through the objectives guiding the current study, which are:

- To identify the level of knowledge of visitors regarding climate change in Al-Mashar National Park.
- To determine the awareness of visitors on Climate Change in Al-Mashar National Park.
- To investigate the perception of visitors regarding climate change in Al-Mashar National Park.

III. MATERIALS AND METHODS

A. Study Area

The Hail Region is situated in the northernmost region of Saudi Arabia. The area is 118,232km² in size. The only important city in the area is Ha'il (Hael), which is situated in the region's center. It is roughly 600km from Riyadh, 450km from Madinah, and 650km from Tabuk, and has good connectivity to other regional centers. Due to its elevation of 915m above sea level, Ha'il experiences a mild climate. Ha'il's geographic location offers a number of benefits, including a moderate climate and picturesque mountain and desert landscapes [12]. In Ha'il, the winters are chilly, dry, windy, and mainly clear while the summers are lengthy, scorching, desert, and clear. The average annual temperature ranges from 39 to 103°F, rarely falling below 31 or rising over 108 [22]. Early May through early July and early September through mid-

October are the ideal seasons to visit Ha'il for hot-weather activities, according to the beach/pool score [13].



Fig. 1. Mashar National Park.

B. Methodology

This research uses a social constructionist approach to examine subjective meanings, experiences, and behaviors of visitors related to global standards of climate change. This KAP research adopted the quantitative method using a questionnaire survey for data collection. There were 4 sections in the questionnaire. Information on the sociodemographic characteristics of park visitors was presented in Section A and Sections B, C, and D consisted of questions regarding the knowledge, attitudes, and perceptions relating to climate change respectively. The content was validated to make sure that the items measured the things they were meant to measure. Quantitative data analysis was done using SPSS software and was further presented and interpreted using frequency distribution tables and narratives were scripted to discuss the findings.

IV. RESULTS AND DISCUSSION

A. Visitors Knowledge on Climate Change

Table I presents whether the visitors are informed of climate change as a concept. We see that the majority of 108 (90%) visitors claim to know what climate change is while 12 (10%) were not informed about climate change. Table II presents the sources of knowledge on climate change. Table III presents the visitors' perception on the types of change in climate change. It should be noted that the majority of the respondents is aware of at least one major change in weather patterns due to climate change, but a significant minority (22.8%) claims to be unaware or uninformed.

TABLE I. BEING INFORMED ABOUT CLIMATE CHANGE

Informed	Frequency	Percentage
Yes	108	90%
No	12	10%

TABLE II. SOURCES OF KNOWLEDGE ON CLIMATE CHANGE

Sources	Frequency	Percentage
Newspapers	25	15.4%
Radio	19	11.7%
Television	32	19.7%
Health workers	9	5.5%
Teachers	51	31.4%
Family members	13	8.3%
Religious leaders	10	6.2%
Others	3	1.8%

TABLE III. CLIMATE CHANGE ACKNOWLEDGED TYPES

Change	Frequency	Percentage
Excessive temperature	41	26.7%
Excessive cold	19	9.8%
Alteration in the rainfall pattern	42	27.4%
Recurring cyclones or tides	3	1.9%
Periodic floods	10	6.5%
Logging in water	7	4.5%
Unaware or uninformed	35	22.8%

TABLE IV. CAUSES OF CLIMATE CHANGE

Causes	Frequency	Percentage
Deforestation	45	29.4%
Industrial effluents	21	13.7%
Population growth	19	12.4%
Automobiles' dark exhaust smoke	15	9.8%
High carbon emissions from developed nations	17	12.5%
Rapid urbanization and lifestyle changes	7	4.5%
Astrophysical event (polar wander)	3	1.9%
Unaware or uninformed	26	16.9%

Table IV presents visitors' perception of the causes of climate change.

B. Visitors Awareness on Climate Change

Table V presents how often visitors are getting informed on climate change. We can see that the majority is informed either frequently or very frequently. Table VI presents the sources of information on climate change. It should be noted that the majority does not mention mass media as the source of information.

TABLE V. FREQUENCY OF AWARENESS OF CLIMATE CHANGE

Frequency level	Frequency	Percentage
Very frequently	41	34.1%
Frequently	35	29.1%
Occasionally	16	13.3%
Rarely	11	9.1%
Very rarely	7	5.8%
Never	10	8.3%

TABLE VI. SOURCE OF INFORMATION ON CLIMATE CHANGE

Source	Frequency	Percentage
Scientist	44	36.6%
Teacher	40	33.4%
Neighbour/friend	6	5%
Mass media	30	25%

C. Visitors Perception on Climate Change

Table VII presents visitor's perception of climate change while Table VIII presents the component of climate change felt the most by the respondents the majority of which reported temperature change as the most vivid climate change indicator.

TABLE VII. PERCEPTIONS ON CLIMATE CHANGE

Perception	Agree		Undecided		Disagree	
	Frequency	%	Frequency	%	Frequency	%
Rainfall pattern is changing	90	78	10	10.3	20	16.6
Timing of the rainfall is changing	70	58.8	8	6.6	42	33
The amount of rainfall is changing	80	66.6	4	3.3	36	30
The intensity of rainfall is changing	66	55	23	19.1	31	25.8
Summer temperature is changing	60	50	15	12.5	45	37.5
Hot waves are changing	90	75.1	8	6.6	22	18.3
Cold waves are changing	70	58.3	20	16.6	30	25.1
Winter temperature is changing	77	64.1	19	15.8	24	20.1
The overall annual temperature is changing	88	73.3	12	10	20	16.6
Hail-storm event frequency is changing	100	83.3	0	0	20	16.6
Thunderstorm and lightning event frequency is changing	60	50	40	33.3	20	16.6
Wind velocity is changing	85	70.8	17	14.1	18	15

TABLE VIII. COMPONENTS OF CLIMATE CHANGE FELT THE MOST

Component	Frequency	Percentage
Temperature	71	59.1%
Rainfall	32	26.6%
Wind	10	8.3%
Hail-storm	3	2.5%
Lightening	4	3.3%

TABLE IX. BEHAVIORS EXHIBITED TO REDUCE THE IMPACT OF CLIMATE CHANGE FELT THE MOST

Behaviour	Frequency	Percentage
Reducing energy consumption	15	11.8%
Reducing water consumption	16	12.5%
Waste recycling	19	14.9%
Reducing consumption of disposable items	17	13.3%
Buying environmentally friendly products	12	10%
Installing renewable energy equipment, e.g. solar panels	8	6.2%
None	17	13.3%
Don't know/don't understand	23	18.1%

Table IX presents the behaviors reported by the visitors on what they do to reduce the impact of climate change. It should be noticed that the majority already does something regarding climate change in their everyday life, but a significant minority of 23 (18.1%) visitors don't know/understand the habits to be exhibited in order to reduce the impact of climate change.

V. DISCUSSION

This research has made it clear that visitors to Al-Mashar national park feel responsible for the protection of the park but are not fully equipped with the necessary technical know-how in terms of capacity on issues surrounding climate change in their region. It is also evident that the research subjects, i.e the Al-Mashar National Park visitors, want to learn more about climate change and the actions they can take to mitigate its effects on these treasured landscapes. Furthermore, with proper education and access to varying information sources about climate change, visitors can become important advocates in the need to respond to climate change, within the parks and their communities.

VI. CONCLUSION AND RECOMMENDATIONS

Since climate change is a complicated topic that is frequently met with skepticism, there is a need for convincing evidence to prove its truth. The findings of this study prove that, despite the fact that Saudi Arabia is clearly experiencing climate variability, visitors to Al-Mashar Park are not adequately equipped to lessen the effects of climate change. The administration of protected areas, visitor traffic, and regional economics are all expected to be impacted in a complicated and cascading manner by a changing climate. Recognizing the strong correlation between visitation and climate allows for future planning and has two main effects on the management of protected areas and municipal services: travel patterns will change [14] and services and facilities will need to adapt to changing needs. To adjust to the changing conditions, which are a result of climate change, involves minimizing harm and seizing advantageous chances [15]. In the future, it might be necessary for the administration of Al-Mashar National Park to balance the benefits of shifting

visiting patterns with the negative effects of both too few and too many people attend (either not enough tourists to support local businesses and far too many tourists that interfere with recreational fun), e.g. by increased recreation and education opportunities and visitation during shoulder seasons. Changes in the environment as well as modifications in visitor usage and preference patterns are predicted to occur in the ensuing decades. Protected places and their surrounding communities, like Al-Mashar National Park, will need to adapt to the opportunities provided by changing visitors, and they may be able to take use of them. Globally comparable historical weather data and future estimates are available, however the availability and methodology of visitation data in different protected areas varies greatly. Al-Mashar National Park management can increase tourist satisfaction and combine it with increased efforts to measure human visitation trends. The current analysis can be followed by additional studies into relatively brief visitation patterns and other drivers of visitation in order to help the management adapt to the effects of climate change.

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