

Supplement 1 Detailed Methodology and Results for the Focus Group Meetings

S1.1 Methodology

To determine the content of the videos, including the optimal use of the geocultural connections, two focus group meetings were conducted, once in the UAE and once in Oman. Key partners and decision makers involved in the protection and communication of Quaternary sites, including museum professionals, geoscientists, archaeologists, and officials from the Ministry of Heritage, were invited to participate. The participants were provided with a brief presentation on the relationship between archaeology, culture, and the palaeoenvironment by the authors, followed by a discussion on three main topics: their reaction to the presentation, recommendations based on past experiences, and identification of the main factors to be emphasised in the videos. The focus groups were designed to last approximately one hour and half to two hours each. Considering the linguistic abilities of the participants, the focus group in Oman was conducted in English with Arabic interpretation available upon request, while the focus group in the UAE was conducted in both English and Arabic, facilitated by an interpreter.

The discussions in the focus groups were recorded, transcribed, coded, and analysed qualitatively using a combination of deductive and inductive content analysis via NVivo to categories and themes related to the research questions.

S1.2 Results

The focus group in the UAE took place in November 2022 at Buhais Geology Park, and the focus group in Oman was conducted in December 2022 at the Oman National Museum. As demonstrated in Table 1 in the UAE, participants included an archaeologist, two staff from a geology museum and two staff from an archaeology museum. In Oman, the focus group was attended by two archaeologists, two staff from the National Museum, an officer from the Ministry of Heritage, and two geologists. Both genders and nationals and non-nationals were intentionally selected to ensure diversity among participants.

Table S1 Participant profile for the focus groups conducted in this study

	Participants	Number	Non-nationals
UAE	Archaeologist	1	1
	Staff from Buhais Geology Park	2	0
	Staff from Mleiha Archaeology Center	2	2
Oman	Archaeologist	2	1
	Geologist	2	0
	Staff from the National Museum of Oman	2	0
	Staff from Ministry of Heritage	1	0

themes emerged, summarising the key points discussed. Overall, the focus groups highlighted the importance of striking a delicate balance between aesthetic appeal, scientific rigor, and cultural resonance in creating an effective video for communicating Quaternary geoheritage sites. It was also emphasised that the narrative should be designed with care to engage and enhance audience understanding.

S1.2.1 Visual preference

The focus groups included in-depth discussions about the most suitable visuals to include in the video. The consensus view favoured aesthetic images over detailed scientific visuals to engage audiences with Quaternary geoheritage sites. Additionally, in the UAE, there was widespread approval for selecting scientific images that also had aesthetic appeal. Participants highlighted the crucial role of captivating visuals in capturing initial interest, particularly among non-specialists. One participant aptly summarised this sentiment, stating “for me it's the image from the first glance, you can decide whether you will like it or not like it. You are interested, you will go further, or you withdraw.” However, participants also recognised the importance of incorporating scientific imagery strategically to explain key processes and explore the values of sites beyond their aesthetic beauty. This balanced approach was seen as essential for providing a comprehensive understanding of Quaternary geoheritage sites.

S1.2.2 Financial matters

The discussion on whether to include the economic potential and benefit of protecting Quaternary sites generated varied opinions within the focus groups. In the UAE, participants unanimously advised against emphasising economic benefits in a video targeting non-specialists, despite a shared recognition of its importance. Conversely, in Oman, the participants overall supported the inclusion of the economic relevance, although two participants highlighted the importance of not making this element the

video's main message. In summary, there was a recognition of the importance of financial aspects to make the topic more relatable to the audience, especially for ones living near the sites. However, there was an agreement that economic considerations should be introduced sporadically in the video without overshadowing other content.

S1.2.3 Need to raise awareness

The importance of raising awareness about Quaternary geoheritage sites received unanimous support in both focus groups, with no negative opinions. Participants underscored the prevalent lack of awareness among the local people and communities regarding the importance and significance of the regional Quaternary sites and advocated for clear, accessible communication with little to no technical jargon. However, discussions also emphasised the need to consider the underlying motivations and objectives of any awareness-raising efforts. One participant highlighted this by commenting: “the question that we always forget is, why do we want people to be aware of those sites, maybe it's actually good for them not to be aware of this kind of stuff.” A clear message describing why the topic is relevant for the audience was identified as an essential component in the video.

S1.2.4 Narrative

Participants unanimously endorsed the need to include a compelling narrative to engage audiences. Two distinct concepts emerged in this regard. First, participants highlighted the potential of narratives that stimulate the audience's imagination and allow them to envision the past. Second, the participants agreed that the use of the geocultural context can be an effective way for viewers to create personal ties with the subject. Notably, suggestions were made to incorporate culturally relevant anecdotes, such as verses from the Quran with resonance to historical climate change in Arabia, to enhance viewer engagement and comprehension.

S1.2.5 Local people, culture, and knowledge

In both focus groups, the idea of involving older/respected figures to narrate the cultural relationship between humans and the regional landscape was discussed as a potentially effective strategy for introducing Quaternary geoheritage sites. The concept of cultural identity was highly emphasised and supported in these discussions. Four participants shared anecdotes in which a site's relevance to the local community significantly influenced how people perceived its importance. Positive responses to this idea were not limited to participants who were nationals of the UAE or Oman but were emphasised more by non-national participants. In Oman, there was a discussion on the importance of the storyteller's identity, with an agreement that a foreign researcher presenting this idea is not negative, but having a local person telling the story would be preferable whenever possible.

Although the introduction of the geocultural context by local figures was supported, the use of interviews in the videos evoked mixed views. Four participants in the focus group in Oman were enthusiastically supportive of using interviews, noting that they lend scientific information with more authority in delivering the message. Additionally, proponents of interviews mentioned how voices of respected (widely supported) or

locally based figures can make the subject more personal and relatable. However, in the group in the UAE, participants unanimously spoke against the idea of interviews, expressing concerns that they could make the video resemble a "lecture" or a "documentary", which people might find "boring". Even in Oman, one of the participants was wary of the use of interviews, suggesting they should be very brief and scattered even if used at all. A similar sentiment was expressed by the supporters of the interview, leading to the conclusion that the interviews, if included, should be few and short.

S1.2.6 Scientific information

In each of the focus groups, some participants (three in the UAE, one in Oman) initially considered scientific information the most important factor to introduce in the video. Overall, there was no disagreement about the importance of conveying the general idea of what makes each site scientifically significant. However, during the discussions, different ideas emerged regarding the depth to which the video should engage with scientific information. While there was overall agreement on the value of the scientific information in introducing the main features of the site and justifying why it is worthy of protection, opinions diverged on the level of detail that should be included. While two participants supported providing detailed scientific information, others were more supportive of presenting simple, general ideas rather than delving into the specifics.

S1.2.7 Sequence of presentation

At the end of the focus groups, strategic discussions revolved around the optimal sequencing of elements in the video. Participants generally favoured starting with aesthetically pleasing images to captivate the audience, particularly those who are not inherently interested in geology. Nearly all participants, with the exception of one who did not express an opinion, agreed that if interviews were

to be included, they should not be placed at the beginning of the video to avoid giving it a lecture-like feel. There was also a consensus on the need for a simple description of the general concept of geoheritage. As one participant mentioned, “images without information would not mean anything to the viewers”, highlighting the importance of providing a straightforward explanation of the general concept without using technical jargon. In Oman, the focus group proposed the idea of introducing the superiority of the region’s Quaternary geoheritage by describing what makes it special or unique. Additionally, participants widely supported the idea of creating a connection (e.g. cultural, economic) between the audience and the subject matter. However, there was agreement that the economic aspect should be introduced after the general idea, so as not to overshadow other aspects of the video’s message.

Discussions also favoured the idea of introducing deeper details of the relevance of Quaternary geoheritage sites (cultural, economic, scientific, etc.) later in the video, once the viewers gain a general understanding and developed a connection with the subject. The use of case studies was supported by many participants, although two participants in the UAE opposed to this idea, identifying case studies as the least important element.