Comment on hess-2021-173
Anonymous Referee #2

The article shows that the authors have put much effort into their literature review, which is appreciated. However, the paper needs significant improvements in scientific significance, scientific quality, and presentation quality.

- The paper’s subject is unclear. The title suggests that the authors will argue the specific way(s) in which technology and culture interacted in shaping water management in ancient Iran. Nevertheless, this topic is not touched on in the paper. The Abstract suggests two other topics: a) a brief history of water management in Iran; b) how geoclimatic functions control water regimes, settlement patterns, and [undefined] socioeconomic issues. A brief history of water management in Iran fits most closely the content of the paper.
- I was not able to find an original argument in the paper. A very general introduction with ambitious statements is followed by detailed facts about individual hydraulic structures across the country. Those facts, if well integrated, could be used in a survey-style textbook chapter on hydraulic structures in ancient Iran. The research questions stated in the introduction (48-52) can be considered an outline of a term paper, but they fall short of proposing or addressing a worthwhile problem in water history studies.
- The facts about specific hydraulic infrastructures and specific archaeological sites are too detailed without being integrated into a general theoretical discussion. Literature review without integration has resulted in some contradicting statements, for example, regarding the state of water management in the Islamic period. A statement about the innovations in hydraulic technology in the early Islamic period is followed by a paragraph on the demise of water management in the same period. For the same reason, some sections like “Historical Evolution of Life in Iran” do not relate to the paper’s topic.
- Several critical arguments in the paper are wrong, outdated, or unsupported. To name a few:
  - There is no evidence that difficulties of access to water management for a large urban
population in southwestern Iran were the catalyst of systematic water management. It is unclear what do the authors mean by systematic water management. In any case, early riverine societies seem to have developed canal irrigation independently and simultaneously.

- There is no evidence that the irrigation systems of southwestern Iran were the adoption of a Mesopotamian water management system. The entire discussion on “Mesopotamian water management” is inaccurate. Canal irrigation was not an inherently Mesopotamian development. Nor was Fertile Crescent’s agriculture and economy under Mesopotamian control.

- Even though qanat irrigation is a much later technology than canal irrigation, and even though qanat tends to be found in arid regions without permanent rivers, one cannot simply state that qanats were developed because the “Mesopotamian water-based technology” could not meet the needs of arid regions. This statement presumes a causal relationship between two separate phenomena with their complicated development history.

- The origin and early history of qanat’s development are still unknown. It is hard to pinpoint its development to a specific location even though Iran seems to be a good candidate. Moreover, there is absolutely no data to support that Achaemenids used qanats to intensify agriculture across their empire, other than the Western desert in Egypt. In fact, the most well-dated evidence from the Achaemenid period from Fars is for canal irrigation.

- There is no evidence to support recession in irrigation or agriculture in the Seleucid or Parthian period. The most well-documented evidence comes from Khuzistan which shows a steady development of canal systems from Achaemenid to the Sasanian period.

- The conclusion is a very general discussion of modern water management issues in Iran rather than a summary of the body of the evidence.