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Evaluation of PhD Thesis of Kasper Hanus:

1) The aims and structure of the thesis

The thesis *The water, the sand and the folk: Understanding the role of water in the social life of the oasis-cities of the Shan-Shan Kingdom*, by Kasper Hanus, investigates the social role that water control played in the oases of the eastern Tarim Basin that together were integrated into the Shan Shan kingdom in the late first millennium BCE and early centuries CE. The thesis aims to contribute both to our understanding of the Shan Shan kingdom specifically through examining the archaeological and textual evidence for a social significance of water control and to a cross-cultural discourse on the way in which water control specifically has been shown to be important in various ways to social power and organization.

The organization of the thesis is straightforward and appropriate. After a brief introduction to the general theme and case study the author provides a thorough discussion of the “social roles of water,” with a particular attention to the most well-known theorist in this literature: Karl Wittfogel. This discussion is followed by a discussion of the methodological contributions of the dissertation that involve remote sensing data. In this chapter the author not only makes clear the original aspects of this research but also justifies the utility of taking that approach in the context of the Shan Shan case study. Chapters 4 and 5 provide an overview of the existing data set related to Shan Shan from textual and archaeological sources, and in Chapter 5 in particular the author synthesizes published archaeological work and contributes new observations based on the remote sensing data that he obtained. Chapters 6 and 7 provide the interpretations of the broader social issues based on the previously outlined data and address the various questions of social power and social organization that are previously posed. Chapter 7 in particular offers the author’s interpretations of the Shan Shan kingdom in relation to water control. The results are then brought together in Chapter 8.

Throughout the dissertation, the author makes a series of new observations based on his bringing together of the existing data, his newly acquired and examined satellite imagery, and the theoretical discussions of water management. He clarifies how the social and political system of Shan Shan developed through a focus on water. He frames this process as one that characterizes “resilience” – and his overall view is that the communities in the oases of the eastern Tarim Basin “promoted stability at every turn”. This is not to say that water pervaded every aspect of Shan Shan society. He does not find evidence of a strong connection between water control and religious activity in the oases, and the connections to military activity are complicated by a bifurcated aspect of the military control of the region the involved both local and external military forces. In general, the nuanced view that the author provides give a good sense of the specific ways in which water control was important in the structuring of society.

2) Workflow

Throughout the dissertation, Hanus tacks back and forth between the broader questions that drive the study and the specific case study from the Tarim Basin. The overall result is very satisfying because at no point does the reader feel that the conversation has strayed too far into abstract discussions without empirical grounding nor does the reader get overwhelmed by details of the case study that do not seem relevant to the broader themes. Instead, by effectively keeping both the big-picture and the case study in mind, the author has produced a relatively tight thesis that contributes to both broader discussions and the historical study of the Shan Shan kingdom.

The overall structure of the thesis puts the broader theoretical and methodological discussions first. I am predisposed to prefer this structure, since it makes the overall significance of the case study more significant to a broader readership. The discussion of Wittfogel is particularly thorough, although it could have used a bit more clarity about what aspects of the content were specifically from Wittfogel, and which were commentary or adjustments made by Hanus (more on this below). Connected to this was a discussion of the notion of “resilience”, which brings the Wittfogelian focus on water control into conversation with a broader sense of environmental consciousness and social adjustment and resiliency in the Anthropocene. There are aspects of this discussion, further discussed below, that I think could use some improvement, but it is a generally good examination of the material.

The discussion of the utility and the technical aspects of satellite remote sensing data are quite excellent and demonstrate the command of the author over these data sources while at the same time justifying the importance of this approach in the context of studies of arid Central Asia.

In the synthetic work done by Hanus he shows a good command over the various data that exist, and while his research on excavated texts and archaeological excavations (necessarily) relies on secondary sources, he does an excellent job of producing a thorough and easy to follow examination of these data as far as they are relevant to his assessment of the importance of water control in Shan Shan. This through synthesis then allows him to constructively talk about the Shan Shan water control situation in his two chapters of analysis.

3) Analysis of Content

Here I offer a series of comments about the contents of the dissertation in the order that the topics appear within the text. My general impressions are summarized in the next section.

Introduction:

In general the introduction does a good job of outlining the subject matter to be discussed. I think the opening sentence is a bit too colloquial for the genre, and the same could be said for the beginning of the first sentence in section 1.2. I do not typically object to the author inserting himself or herself into the prose, but the Strang quote stands for itself, for example, and doesn't need defending.

Although overall the dissertation is well written, already at the beginning of the introduction there is ample evidence of minor grammatical problems that reflect the author not being a native English speaker. At no point are these issues a major problem, and they mostly involve misuse of definite and indefinite articles, a common issue with non-native writers in English. I will share a marked up version of the dissertation with the author that points out some of these issues.

In section 1.2 I note two issues that are more substantial and require some thinking on the part of the author – and perhaps need to be defended. First, the question that the author identifies here (and repeats throughout the dissertation as the central question) actually doesn't seem to me to be stated in

the best way. The question is: "Why the social and political system developed by past inhabitants of Shan Shan region made the oases sustainable, durable and resilient?"

This is actually not a "why" question. More properly it should be "How did the social and political system developed by past inhabitants of the Shan Shan region make the oases sustainable, durable and resilient?" And even this reformulation is not entirely acceptable, because it assumes that it is already proven that the oases were "sustainable, durable and resilient". I think the dissertation central question should be rephrased as a two part question: 1) "Can we demonstrate that the Shan Shan oases were sustainable, durable and resilient?" and 2) "How did the social and political system developed by past inhabitants of the Shan Shan region make this possible?"

The problem with this reformulation relates to issue number two. Although the author does discuss the concepts of "resilience" and "sustainability," these discussions do not make the concept of resilience something that can be evaluated in the context of the Shan Shan kingdom. Essentially, the author ultimately simply asserts that these communities were resilient simply because they existed for a period of time. In the introduction, the last paragraph of section 1.2 defines sustainability as the ability to "continually exist" and resilience as the recovery to "status quo ante", but societies are always changing, and resilience actually recognizes this (as Hanus himself recognizes by invoking Giddens and structuration theory later in the thesis).

I thought the introduction also could have included a bit more on contemporary discussions of water politics. I was surprised that the author did not reference Michael Harrower's book here or in the conclusion:

Harrower, Michael J. (2016). *Water Histories and Spatial Archaeology: Ancient Yemen and the American West*. Cambridge, Cambridge University Press.

My only other comment on the introduction is that the casual reference to the ethnic identity of individuals in the Tarim basin is worded in such a way that seems insufficiently critical of the previous scholarship on the question of identity, but this issue arises later in the dissertation again.

Chapter 2:

This chapter discusses the broad significance of water in society. Again, the aforementioned Harrower book might have been useful to include in this chapter. Furthermore, I note another aspect of the way in which water is used in warfare that might be useful to mention at least in passing: water has been used as a weapon in warfare as well. Famously in China, rivers were diverted, for example in the conflicts documented in the *Romance of the Three Kingdoms* to flood entire cities.

The discussion of Wittfogel is good and quite thorough. At times it is possible for the reader to forget that much of what is discussed in 2.2.2 and on is a direct summary of Wittfogel. Although this is made explicit at the start of the section, it would be useful to restate, at the end of this section, in the words of the author (Hanus) what the major take-away from this is. Furthermore, section 2.2.3 seems to continue to summarize (rather than build on or change) Wittfogel's positions, but here it is less clear whether this is a summary or original ideas of Hanus.

The same could be said for section 2.2.4. On page 36, for example, there is reference in a quote to "strong property", which presumably comes directly from Wittfogel, but there is no page cited. Perhaps most importantly, this section discusses the differences between "complex", "semi-complex" and "simple" hydraulic societies – a distinction that Hanus returns to later in the dissertation. It would be

good for the author to better highlight the significance of this distinction here so that the reader's attention is drawn to this typology and it is clearer why it matters.

Later, in section 2.2.7, Hanus ends the first paragraph talking about the categories "the core, the region and the subregion of the hydraulic world". This is very confusing because it seems that maybe these are synonyms for "core, margin and sub-margin". Nowhere else is the core, region and subregion discussed, although margin and sub-margin are discussed later. This needs to be cleared up. As with the previous comments, there are parts of this section where it is not clear if the examples are Wittfogel's or Hanus'. Does the discussion of the Liao, for example, come from Wittfogel or is this Hanus applying the Wittfogel model to the Liao dynasty? If the latter, there are not citations on the Liao given here to clarify where Hanus gets his information.

On page 42, in the middle of the page there is a paragraph that lays out the types and subtypes according to Wittfogel (a, r, C, L, + and -). These are used in the conclusion, and a table here would make them more easy to understand.

The critical discussion of Wittfogel is good, and it does a nice job of setting up the discussion of the Shan Shan case study. Section 2.4 is an excellent, succinct and well presented outline of the various lines of evidence available associated with the Shan Shan polity.

Chapter 3:

This chapter outlines the sources of satellite, textual and archaeological data available to the author for his study. It is very easy to follow and thorough. I have not critical comments on this chapter.

Chapter 4:

This chapter too does a very good job with data presentation. I have only minor comments of a few aspects, and one general suggestion.

On page 76 Hanus adopts a published description of deceased bodies as "Caucasoid" and "Mongoloid" and on page 77 Hanus accepts the description of a dead individual as "Caucasian male." These reflect outdated approaches to biological identity and I would argue that Hanus should clarify what such descriptions are based on (or eliminate them altogether).

My general suggestion is that Hanus should more clearly state questions that exist based on the summary here. Ideally, the chapter would pose some specific questions that could be answered / considered / addressed through the archaeological and textual data that are available. This would lead nicely into the next chapters.

Chapter 5:

This is a very thorough chapter. The scale bars on many of the satellite images are hard to see, and perhaps this can be adjusted at least in any future publications. Another adjustment that could be made to the figures is that many of the drawings from Stein do not have North at the top of the drawing, but the associated satellite image that has been inserted has North at the top. This means that the two parts of the figure are not directly comparable. It would not be too difficult for Hanus to rotate the Stein drawings to have North on the top of the image.

Chapter 6:

The chapter starts off by saying that the previous chapters have laid out a model. I am not sure this is the right term. Is it really a model? It is more like a list of factors. You cannot “disprove” anything that has been put forward. Instead, it is a framework (maybe a framing model) of how to approach the question of how water control operated in the context of the Shan Shan kingdom. The central question that has been proposed, as previously discussed, is a question that asks for a description. It is not a question that asks whether or not something is true or is “testable” in any way.

On page 159 Hanus introduces the space syntax analysis off Hillier and Hanson. The summary is well done and sets up a useful discussion of the structure of the irrigation system. I wonder if the author has thought about how this approach relates to the patterns, terminology and interpretations that have been put forward in sociological studies of social networks. Perhaps this is a direction to pursue further in future work.

In section 6.2.4.2 there seems to be a contradiction. The author says:
“the literal adaptation of H&H workflow envisaged that each canal would be marked as a solid black dot and each sluice will be represented as a line”

Then the author says:
“the linear canals should be represented as lines and sluices as junctions should be marked as dots”

Then the figure (6.07) has the canals as dots and the sluices as lines...

Why, if the author thinks that the latter should be the case, does he adopt the former? Perhaps I am not understanding something here .

On page 163 Hanus points out that the irrigation network has an “unambiguously asymmetric” graph. Isn’t this always the case with water flow? Can you actually have a symmetric graph? What would that mean?

On page 166, at the end of section 6.2.5, the author mentions thefts of water in documents and cites Bertrand 2012. These would seem important enough to the points of the dissertation to quote here in full.

On page 167 Hanus says “After determining which buildings meet the definition of monumentality...” but it is never made clear how you unambiguously determine this... it is more of a subjective assessment.

Related to this, in the first paragraph of 6.3.1, the statement “Monumental architecture was not only more substantial, as Trigger predicted...” ... but this isn’t really something that is tested. Hanus doesn’t have two independent variables here (monumentality and substantialness)... instead, he assumes something is “monumental” if it is “substantial”. Ultimately Hanus suggests that monumental things “surpass practical needs” ... but how can this be demonstrated conclusively?

On page 181 there is a discussion of the difference between the fortified locations and rural surroundings. He points out that “urban complexes were not only spots of higher occupational density – but served as the cultural, economic, political and social centre for the hinterland”. It might benefit for him to read the following discussions of the multifaceted nature of urbanism as further support for this discussion:

Flad, Rowan K. (2017). Urbanism as technology in China. *Archaeological Research in Asia* 14: 121-134.

Cowgill, George L. (2004). Origins and Development of Urbanism: Archaeological Perspectives. *Annual Review of Anthropology* 33: 525-549.

In section 6.4.2, I wonder if it wouldn't make intuitive sense for the canals to be on the upslope side of the field that they serve. Is there any evidence about how contemporary / ethnographic field systems are situated in relation to their feeder canals?

It would have been useful for Chapter 6 to have ended with explicit questions that are then taken up in the discussion in Chapter 7.

Chapter 7:

This chapter starts with a restatement of the driving question of the dissertation (which I have already commented on). Following this is a discussion of resilience. Hanus clarifies that resilience is a more appropriate concept than sustainability in this context, and I find the argument compelling. Here he does not seem to restate the idea (from the introduction) that resilience implies return to the status quo. Instead, in section 7.1.2 (page 211) he discusses Anthony Giddens and structuration. There does seem to be a bit of a misunderstanding of the theory here. Hanus states that structuration theory "does not give either structure or agency but states that structures and agents are in a balanced position"... but this seems to suggest homeostasis, whereas Giddens (and Bourdieu, who has a similar theorization in his discussion of "practice" theory) actually are wrestling with how structures can *change*. These perspectives actually imply constant change, but that the change is constrained by existing structures.

In section 7.1.1 Hanus states that "Buildings of similar characteristics... imply strong social control"... but isn't the question what *kind* of social control. Similarity can be certainly caused by economic forces. Think about economies of scale and the construction of cookie-cutter similar houses in suburban subdivisions (which don't necessarily imply social control).

On page 209 Hanus says "A 'reconstruction' of the environment during late antiquity clearly indicates that access to water has been restricted". What is the citation for this? It is not sufficiently discussed in the thesis before this point.

Later down this page it is surprising that Hanus never mentions "Yu the great" and other similar myths of flood control when discussing how successful water management relate to governance.

On page 212 Hanus says, parenthetically, "I deliberately omit time aspects, which has no application for my case study"... How is this possible? It may be hard to tease these out, but certainly time aspects are critically important when really trying to understand the Shan Shan kingdom or any historical case of water management. In fact, on page 223, when Hanus discusses the nature of architecture and the relation to water management I wonder if these aspects might not have changed over time in the oases.

Page 271 – Here Hanus discusses the "attachment" of crafts persons to elite or wealthy individuals. There is a huge literature on this topic that is not referenced here. I would suggest minimally citing one or more of the following:

Costin, Cathy L. (1991). Craft Specialization: Issues in Defining, Documenting, and Explaining the Organization of Production. *Archaeological Method and Theory*, edited by Michael B. Schiffer. Tuscon, AZ, University of Arizona Press: 1-56.

Costin, Cathy L. (2001). Craft Production Systems. *Archaeology at the Millennium: A Sourcebook*, edited by Gary M. Feinman and T. D. Price. New York, Kluwer Academic / Plenum Publishers: 273-327.

Flad, Rowan K. (2007). Rethinking the Context of Production through an Archaeological Study of Ancient Salt Production in the Sichuan Basin, China. *Rethinking Craft Specialization in Complex Societies: Archaeological Analyses of the Social Meaning of Production*, edited by Z. X. Hruby and R. K. Flad. Berkeley, American Anthropological Association and the University of California Press: 108-128.

In the model discussed around page 226, it is not entirely clear what the author means by “apparatus”. This should be explained more clearly.

Chapter 8:

Here the main points of the thesis are summarized and the observations related to the Shan Shan kingdom are discussed in connection to Wittfogel’s theory and model.

4) General Opinion

The thesis makes some really interesting and important observations. Many of these are made most explicit near the end of Chapter 6. The irrigation system in the Shan Shan kingdom was facilitated by the state. This is made most clear by the construction of administrative residences. Agricultural land was divided into plots of roughly equal size. Armed forces in the region were marginally important, but imperial forces would react if Chinese interests were threatened. Water management was generally separate from religious architecture, suggesting that the management of water was primarily a secular activity.

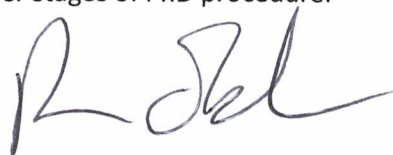
Together, these observations not only provide a fairly clear assessment of the nature of water management and its social role in the Shan Shan kingdom oases, but also outline a set of considerations to be evaluated in any context where the social function of water management is being assessed. As such, Hanus presents a useful framework for studies of the social significance of water in other contexts.

The question of resilience, although frequently raised, is only partially addressed by the thesis, because there is no real consideration of when, how, and why these oasis communities ultimately failed. In order to understand the degree to which the water management actually staved off potential failures and contributed to resilience, it would be useful to have a comparison to this systemic failure that happened later – or to have compared different trajectories of two different oases. Unfortunately the data resolution for the latter might not be sufficiently high. A clearer acknowledgement of time would be useful to include in the thesis. There obviously was a limit to the resilience of these oasis communities since eventually they were abandoned.

5) Final Statement

I think that the thesis *The water, the sand and the folk: Understanding the role of water in the social life of the oasis-cities of the Shan-Shan Kingdom* by Kasper Hanus exceeds the PhD requirements (according to the article 13, paragraph 1 of the Act on scientific degrees and titles from March 14th, 2003) and I do request to allow him to progress to further stages of PhD procedure.

Signed,



Rowan Flad (John E. Hudson Professor of Archaeology, Harvard University)

