An Analytical-Scientific Justification for the Existence of Cuesta in Iran (with Emphasis on the Existence of Cuesta in Tabas Pit)

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Received 28 October 2013 *Accepted 26 January 2014*

Extended Aabstract:

1- INTRODUCTION

As we know, geomorphology is one of the important branches of physical geography that seeks to describe, explain, and interpret the roughness and ruggedness of the earth crust and their development and evolution from a systematic attitude. It should be noted that geologists often focus on the age and formations of such roughness whereas geomorphologists mainly analyze formations and rugged topography and their developments. Since the landforms and ruggedness are developed as a result of various endogenous and exogenous factors, other branches of earth sciences, particularly geology and climatology provide the basic data for the analysis of rugged systems utilized by geomorphologists. In this regard, it should be said that cuestas are the expression of extensive outcrops of gently dipping strata, typically sedimentary strata, that consist of alternating beds of weak or loosely cemented strata.

As such, in most parts of the planet, especially in the arid and desert land, cuestas can be found. Nonetheless, there are many controversies about the existence of cuesta in Iran, as some believe that there are no instances of cuesta in Iran whereas others, including the author, can offer hard evidences that prove the existence of cuesta in Iran. This article is an attempt to support this claim.

2- THEORETICAL FRAMEWORK

Cuesta is a Spanish term meaning slope or uphill. In fact, it refers to a symmetric ridge with a long and gentle backslope called a dip slope that conforms with the dip of a resistant stratum or strata, called caprock. Given that the hard upper stratum has a low slope (between 1 and 15 degrees) that constitutes the main surface of the slope, it is known as cuesta or dip slope ruggedness. However, there are three different slopes in the transverse side of a cuesta including a gentle and wide slope (behind cuesta on the hard layer), a steep slope (on the edge of the hard layer), and the moderate slope (in the soft lower layer). There are three hypotheses about the genesis and origin of cuesta with two hypotheses related to endogenous factors,

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including the elevation and subsidence on both sides of sedimentary strata and the faulting hypothesis (the disappearance of a gentle anticlinal ridge with the rest of ridges remaining as a cuesta). The third hypothesis is related to exogenous factors, including the Boutonniere hypothesis (expansion and widening of an anticline valley). After the appearance of cuesta, corrosive factors such as three water currents called orthoclinal**,** cataclinal, and anaclinal currents, cause a tremendous change in the frontslope of cuesta and its related morpho-systems (such as Buoute, Shahed Moghadam Hill, etc.)

3- RESEARCH METHODOLOGY

There are two historical and geomorphological methods that underlie any experimental research in the field of geomorphology.

In this paper, in addition to the above two methods, the theoretical foundations of geomorphology with respect to the specifications of cuesta, the factors underlying the emergence and development of cuesta (as mentioned earlier) have discussed. Additionally, the observations and field studies of the author in different parts of Iran (especially in Tabas Pit, Southeast of Kope Dagh, and Kashan-Natanz Road) are consistent with the theoretical foundations of this research. In addition, the investigations of some geomorphology experts, such as Dr. Ibrahim Amin Sobhani (on Natanz - Kashan Road cuesta), Dr. Mousavi and Dr. Harami (the Southeast cuesta in Kope Dagh), and Theodore Oberlander (about cuesta in Zagras Mountains) have been drawn upon here.

4- RESE ARCH FINDINGS

According to the theory and research method, and given the fact that Iran, active in terms of morphotectonics, is located on the desert and dry belt of the Northern Hemisphere, it can be concluded that based on the structure and climatic features as well as the aforementioned theoretical foundations, it seems that the conditions were ripe for the development of cuesta in Iran. It is especially evident in the east of Tabas Pit, given the activities of cuestas and the prevalence of desertification and erosion environment as well as related morpho-systems.

On Zagros Mountains and the southeast of Kopet Dagh, there are conspicuous cuestas created by orthoclinal trends. Near the shores of the Persian Gulf (in the vicinity of Bushehr City) some signs of cuestas can also be found.

5- CONCLUSION

According to the above points and the attached photos, the existence of cuesta in Iran can be confirmed. There are no convincing reasons to reject the above arguments and so far no scientific and logical evidences have been presented by the opponents of this hypothesis.

Given the above-mentioned points, it is suggested that geomorphology experts working in Iranian universities present such evidences to their students and government officials and environmental planners use the above information about

the existence of cuesta as a means to fight erosion, implement development projects, and expand Geomorphotourism

Key words: Cuesta, Iran, Tabas pit, Orthoclinal**,** Cataclinaland anaclinal slopes, Morpho-system.

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How to cite this article:

Zomorodian, M. J. (2015). An analytical-scientific justification for the existence of cuesta in Iran (with emphasis on the existence of cuesta in Tabas Pit). *Journal of Geography and Regional Development, 12*(23), 47-62.
URL http://jgrd.um.ac.ir/index.php/geography/article/view/27556