

[Home](#) > [Journal](#) > [Earth & Environmental Sciences](#) > [JWARP](#)
[Indexing](#) | [View Papers](#) | [Aims & Scope](#) | [Editorial Board](#) | [Guideline](#) | [Article Processing Charges](#)
[JWARP](#) > Vol.1 No.5, November 2009



Watershed Characterization of Wadi Aurnah, Western Arabian Peninsula

PDF (Size: 1920KB) PP. 316-324 DOI: 10.4236/jwarp.2009.15038

Author(s)

Mashael AL SAUD

ABSTRACT

The Western part of Arabian Peninsula constitutes a shield-like mega-structure, in which mountain chains are oriented in the NW-SE direction. Along this mountainous region, surface runoff is almost diverted towards the Red Sea in the west. Thus, several catchment topographic units exist to capture rainfall water among them. Even though, the precipitation rate in the Western part of Arabian Peninsula is low (i.e. <200mm), yet a number of drainage systems occur and reveal empirical stream networking. However, studies belong to the watersheds located in the Western part of Arabian Peninsula are still rare and sometimes they show erroneous morphological characterization, notably in the catchments delineation. This is attributed mainly to the complicated drainage pattern, which is structurally-controlled. Thus, related morphological and hydrological studies obtained on these drainage systems reveal discreditable results and measures. This study aims to characterize Wadi Aurnah Watershed (~3113 km²), which comprises a typical catchment in the Western part of Arabian Peninsula. In addition to topographic maps, remotely sensed data (ASTER and IKONOS satellite images) were utilized to delineate water divides with the most precision. Consequently, relevant morphological and hydrological characteristics of Aurnah watershed were obtained.

KEYWORDS

Watershed, Topographic Maps, ASTER, Arabian Peninsula

Cite this paper

 M. AL SAUD, "Watershed Characterization of Wadi Aurnah, Western Arabian Peninsula," *Journal of Water Resource and Protection*, Vol. 1 No. 5, 2009, pp. 316-324. doi: 10.4236/jwarp.2009.15038.

References

- [1] M. Al Saud, " Using satellite imageries to study drainage pattern anomalies in Saudi Arabia," *Environmental Hydrology Journal*, Vol. 15, No. 30, pp. 1215, 2007.
- [2] Italconsult, " Water supply survey for Yeddah– Makkah ?Taif area," Special Report, Geological Investigation, Ministry of Agriculture and Water, No. 3, 1967.
- [3] M. Merza and A. Youssef, " Climate conditions in winter in Makka Al Mukaramah," *Kuwait Geography Society*, Vol. 253, 2001.
- [4] A. Moor and M. Al-Rehaili, " Geological map of Makka Quadrangle sheet 21D," Kingdom of Saudi Arabia, Un-published M.A. Thesis, University of Eastern Michigan, 1989.
- [5] M. Sahl, " Geology of Makka Al Mukaramah City area," Saudi Arabian Deputy Ministry for Mineral Resources, Report DGMR, pp. 238, 1987.
- [6] M. Es-Saeed, Z. Sen, A. Basamad, A. Dahlawi, and W. Al-Bardi, " Strategic groundwater storage in Wadi Naá- man, Makka region, Saudi Arabia," Technical Report (in Arabic), Saudi Geological Survey-TR-2004-1, pp. 32, 2004.
- [7] M. Merza and M. Baroudi, " Geological and geomorphological principles of Makka Al Mukaramah and their role in terrain topography," Unpublished Technical Report (in Arabic), pp. 102, 2005.

- [Open Special Issues](#)
- [Published Special Issues](#)
- [Special Issues Guideline](#)

[JWARP Subscription](#)
[Most popular papers in JWARP](#)
[About JWARP News](#)
[Frequently Asked Questions](#)
[Recommend to Peers](#)
[Recommend to Library](#)
[Contact Us](#)

Downloads:	402,256
------------	---------

Visits:	1,010,162
---------	-----------

[Sponsors, Associates, and Links >>](#)

- [8] I. Aawari, "Vegetation cover in Wadi Noaman with special emphasis on its tributary: Wadi El Majayrish," Un-published MSc thesis (in Arabic), Department of Geog-raphy, Faculty of Arts, Jiddah, KSA, pp. 473, 2005.
- [9] D. Mark, "Relations between field-surveyed channel networks and map-based geomorphometric measures," Inez, Kentucky, Ann. Assoc. Am. Geogr., Vol. 73, No. 30, pp. 358?372, 1983.
- [10] J. O' Callaghan and D. Mark, "The extraction of drainage networks from digital elevation data," Computer Vision, Graphics Image Processing, Vol. 28, pp. 323?344, 1984.
- [11] S. Jenson and J. Domingue, "Extracting topographic structure from digital elevation data for geographic in-formation system analysis," Photogram. Eng. Sens., Vol. 54, No. 1, pp. 1593?1600, 1988.
- [12] A. Tribe, "Automated recognition of valley heads from digital elevation models," Earth Surface Processes Land-forms, Vol. 16, pp. 33?49, 1991.
- [13] A. Ichoku, A. Meisels, and J. Chorowicz, "Detection of drainage channel networks on digital satellite images," International Journal of Remote Sensing, Vol. 17, pp. 1659?1678, 1996.
- [14] J. Martinez-Casasnovas and H. Stuver, "Automated de-lineation of drainage networks and elementary catch-ments from digital elevation models," ITC Journal, Vol. 3, pp. 198?208, 1998.
- [15] Y. Ohsaki, A. Numata and T. Higashinwaatoko, "Validation of rain/no-rain discrimination in the standard TRMM data products 1B21 and 1C21, IEEE., Vol. 2, pp. 875?877, 2000.
- [16] L. Chiu, G. Serafino and W. Terg, "Applications of Tropical Rainfall Measuring Mission (TRMM) data," IEEE, Vol. 5, pp. 2118?2120, 2002.
- [17] C. Scott, C. Thomas and L. Scott, "A comparison of TRMM to other basin-scale estimates of rainfall during the 1999 Hurricane Floyd flood," Natural Hazards, Ac-cepted online, 2009.
- [18] R. Chorley, S. Schumm, D. Sugden, and D. Geomor-phology, Methuen, London, pp. 607, 1984.
- [19] K. Smith, "Standards for grading texture of erosional topography," American Journal of Science, Vol. 248, pp. 655 668, 1950.
- [20] R. Pike, S. Wilson, and S. Elevation-relief ratio, "Hyp-sometric integral and geomorphic area-altitude analysis," GSA Bull., Vol. 82, pp. 1079?1084, 1971.
- [21] D. Gorden, A. McMahon, and L. Finalson, "Stream hy-drology: John Wiley & Sons Ltd," Chichester, England, pp. 523, 1992.