A transient phreatic surface mound, evidenced by a strip of vegetation in an earth dam shoulder

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supplementary material submitted to HSJ**

photogallery

Khasab recharge dam, Oman

Tanuf recharge
dam, Oman

Aerial view of the Al-Khod dam

Satellite image of the Al-Khod dam.

Lake-side view of the embankment, Al-Khod dam, 2004. No shrubs on the slopes
The lake bottom is almost sterile
Area A.

Wet season of 2005. The lake is partially filled. Levee slope vegetation emerging. Area A

Off-lake vegetation:

Acacia tortilis

Euphorbia larica

Crotalaria aegyptiaca

In-lake vegetation:

Parkinsonia aculeata

Prosopis juliflora

Ricinus communis

Pre-Gonu flood (March 2007). Dam crest. The reservoir is full. Tailwater embankment slope hosts occasional herbaceous species. Al-Khod dam. Area A

March 2007. Tailwater side of the levee. First vegetation species.
Al-Khod dam. Area A.

March 2007. Tailwater side of the levee. Plant growing through rip-rap on the gabion. Al-Khod dam. Area A.

Stilling basin of the dam. Pre-Gonu flood of March 2007. The slope of the levee is sterile. Al-Khod dam. Area B.

View of the reservoir area (Jan. 2009) from the crest of the embankment. Post-Gonu but pre-Phet vegetation is scattered. Al-Khod dam. Area A.

Ministry of Regional Municipalities, Environment and Water Resources وزارة البلديات الإقليمية والبيئة ومسواراة المياه	
Wadi Al-Khoud Recharge Dam	سد التغذية الجوفية على وادي الخوض
Length of the Dam : 5100 m	الطول الإجمالي للسد : ٥١٠٠ متر
Maximum-Height : 11 m	أقصى ارتفاع : ١١ متر
Storage Capacity : 11.6 Mm ³	السعة التخزينية : ١١,٦ مليون متر مكعب
Catchment Area : 1635 Km ²	مساحة المستجمع المائي : ١٦٣٥ كيلومتر مربع
Annual Recharge : 3.38 Mil m ³ / year	المعدل السنوي للتغذية الجوفية : ٣,٣٨ مليون متر مكعب في السنة
Spillway : Gabion Spillway 3000m long with stilling basin to reduce the water flow velocity.	المفانض : مفانض من الجاييونات بطول إجمالي ٣٠٠٠ متر ومزود بحوض تهدئة لتقليل سرعة تدفق المياه
Culverts : 11 culverts of 1.2 m diameter.	الفتحات : ١١ فتحة بقطر ١,٢ متر
Construction Materials : Compacted clay, rock, gravel fill, filters, sand and gabions.	المواد المستخدمة في الإنشاء : الأتربة المدكوكة والحصى، ومراشح من الرمل والجاييونات.
Dam design : The dam reservoir is designed to receive and safely release floods happen once in 10 years (1:10 years). Design flood are around 12,500 cubic meters per second.	تصميم السد : بحيرة السد مصممة لاحتجاز الفيضانات العارمة التي تحدث مرة واحدة كل عشر سنوات (١٠:١ سنوات)، ومفانض السد يستطيع تمرير مياه الفيضانات العالية بمقدار ١٢,٥٠٠ متر مكعب في الثانية.
الحفاظ على منجزات النهضة واجب وطني Safeguarding the Achievements of the Renaissance is a National Duty	

Al-Khod dam data
Area B.

Pedon outside the dam area. Jan 2009. Incipient shrub community on the tailwater side. Al-Khod dam. Area A.

Pedon outside the dam lake. Relatively low-permeability “duplex soil” on which the levee was constructed. Al-Khod dam, 2011. Area A.

Pedon outside the dam lake. Relatively low-permeability “duplex soil” on which the levee was constructed. Al-Khod dam, 2011. Area A.

On the tailwater slope of the levee.
Al-Khod dam, 2011. Area A.

On the tailwater slope of the levee.
Al-Khod dam, 2011. Area A.

Embankment crest. Feb. 2011. Al-Khod dam. Area C.

Reservoir area. View form the embankment crest. Al-Khod dam 2011. Area A.

Lake-side slope of the levee. Debris deposition mark indicates the Phet-flood (2010) highest water level. The band of scrub is close to the toe. Al-Khod dam. Area A.

Culvert on the tailwater side. Levee slope sterile. Al-Khod dam 2011. Area C

Sharp interface between the sterile spillover section (with a toe drain) and green undrained levee section. Al-Khod dam, Feb.2011. Area C.

Pedon inside the dam lake. Silt cake. Al-Khod dam, 2011. Area B.

Vegetation on the lake bottom. Al-Khod dam 2011. Area B.

External slope (stilling basin side) of the levee. Sterile. Al-Khod dam 2011. Area B.

Band of scrub on
the lake-side slope of the levee.
Al-Khod dam, 2011. Area B

Band of scrub on the lake-side slope of the levee near the sluice gate.
Al-Khod dam, 2011. Area B.

Band of scrub on the lake-side slope of the levee. Picture from inside the band.
Al-Khod dam, 2011. Area A.

Band of vegetation. Feb 2011. Al-Khod dam. Tailwater slope. Area C.

Band of vegetation. Feb 2011. Al-Khod dam. Like-side slope. Area C.

Band of scrub on the lake-side slope of the levee. Moisture content measurements Al-Khod dam, 2011. Area A.

Main wadi course. Al-Khod dam, February 2011. Area C.

Slope of an artificial excavation in the lake area. Al-Khod dam, February 2011. Area A.

Soil sampling. Al-Khod dam 2011. Area A.

Al-Khod dam, Area A. February 2002.

Al-Khod dam, Area A. February 2010.

LAKE ECOSYSTEM

**Paved desert
ecosystem**

Ecotone 1, lake-side vegetation band

Ecotone 2, tailwater-side vegetation band

April-May 2011: Extermination of vegetation (engineering intervention into an pre-engineered “homeostasis”)

November 2011: Post-extermination re-emergence of the vegetation strip

December 2011: Re-emergence of the vegetation strip

October 2012: vegetation 1.5 years after extermination

April 25, 2013: vegetation just before another extermination in Summer 2013.
One day before a moderate rain.

April 29, 2013: 3 days after a moderate rain, on the eve of a heavy rain (evening, April 29), water sampling from the reservoir

April 30, 2013: 1 day after a heavy rain, current metering in the wadi feeding the reservoir

April 30, 2013: 1 day after a heavy rain, water depth measurements in the wadi feeding the reservoir

April 30, 2013: 1 day after a heavy rain, zone A, the reservoir is full

May 4, 6 days after a heavy rain, reservoir is full and the spillway section of the embankment was overtopped

May 4, 2013, 6 days after a heavy rain, reservoir is full, culverts are open and keep discharging into the stilling basin

May 4, 2013, 6 days after a heavy rain, reservoir is full, the stilling basin is full of water

May 24, 2013: spillway section (zone B) after a heavy rain on April 29

May 24, 2013: stilling basin 24 days after a heavy rain on April 29

December 6, 2013: one week after a heavy rain. Stilling basin. Zone B

December 6, 2013: one week after a heavy rain. Spillway section (zone B) from the crest

January 17, 2014: 2 day before the forthcoming moderate rain
(woody plants exterminated in Summer 2013)

January 17, 2014: 1 day after the last moderate rain

March 29, 2014: 2 days after the last mild rain, preceded by a moderate rain

March 29, 2014: Christ-thorn (local name- sidr tree) in zone A of the dam, inside the reservoir. Fruiting season. Embankment on the background

March 29, 2014: View from the dam crest after a mild rain