
ОХОРОНА НАВКОЛИШНЬОГО СЕРЕДОВИЩА ЛЮДИНИ

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SOIL SALINITATION AND ENVIRONMENTAL CONSERVATION: RAMSAR NATURAL RESERVE OF EL CONDE SMALL-LAKE (LUQUE, CÓRDOBA, SPAIN)

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The main objective of this paper is a geomorphological and sedimentary study about the international Ramsar Reserve of El Conde small-lake (Córdoba, Spain) to know its genesis and current evolution, and to have more details about the probably influence of anthropic activities in its formation with collecting and detour of two around streams and the arrival of sediments to a gypsum triassic depression.

Key words: anthropogenesis, Ramsar Reserve formation, El Conde small-lake, Spain.

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ЗАСОЛЕННЯ ҐРУНТУ ТА ЗАХИСТ НАВКОЛИШНЬОГО СЕРЕДОВИЩА: РАМСАРСЬКИЙ ПРИРОДНИЙ ЗАПОВІДНИК (КОРДОБА, ІСПАНІЯ)

В роботі описано геоморфологічне та осадкове дослідження міжнародного Рамсарського заповідника озера Ель Конде (Кордоба, Іспанія), метою якого є вивчення походження та еволюції даного озера, а також одержання більшої інформації про можливий вплив людини на його формування, появи двох потоків навколо нього і накопиченні осадку в гіпсово-тріасову впадину.

Ключові слова: антропогенез, Рамсарський заповідник, озеро Ель Конде, Іспанія.

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ЗАСОЛЕННОСТЬ ПОЧВЫ И ЗАЩИТА ОКРУЖАЮЩЕЙ СРЕДЫ: РАМСАРСКИЙ ПРИРОДНЫЙ ЗАПОВЕДНИК (КОРДОВА, ИСПАНИЯ)

В работе описано геоморфологическое и осадочное исследование международного Рамсарского заповедника озера Эль Конде (Кордоба, Испания), целью которого является изучение происхождения и эволюции данного озера, а также получение большей информации о возможном влиянии человека в его формировании, появлении двух потоков вокруг него и накоплении осадка в гипсово-триасовую впадину.

Ключевые слова: антропогенез, Рамсарский заповедник, озеро Эль Конде, Испания.

“El Conde” small-lake (40-100 hect. surface) (Luque, Córdoba, Spain) (Fig.1) is currently an international Ramsar Reserve, located in a typical mediterranean semiarid region of the southern part of Spain (Recio Espejo, 1988). Its genesis and evolution are directly related with an anthropic control carried out in the end of XIX century (Arjona y Estrada, 1977), and with some swamp soils problems in the neighbouring area Fig. 2 y 3). The dynamic of this ecosystem is initially related with a current geomorphological evolution of the drainage net during late-holocene (catchs, palaeo-valley and palaeo-streams) (Fig. 4 y 5), controlled by a great plain take up by triassic gypsum (El Salobral) (IGME 1988) that constituted the local basin topographic-level. And later by a human and historical connection/canalizing during XIX century of two independent fluvial streams. A greater water volume and sediment arrival in this hydrological basin would be the main factor of small-lake water sheet origin.

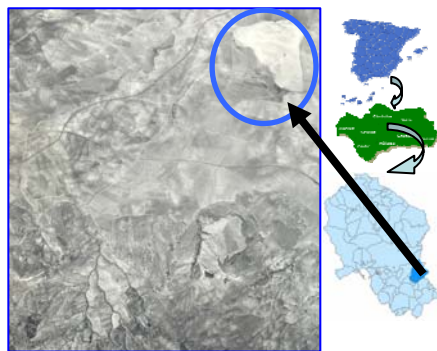


Fig. 1. Geographical location of El Conde small-lake



Fig. 2. “El Conde” small-lake in landscape around



Fig. 3. “El Conde” small-lake

MATERIALS AND METHODS

Geological information to 1:50.000 scale (IGME, 1988), aerial photographs (1955), topographic maps (1:10.000), core by percussion Hammer model HM1800; colour (Munsell Color, 1990); carbonate contents (Duchaufour, 1975); X-ray diffraction minerals identification (Bryndley and Brown, 1980); water physico-chemical characterisation (M.A.P.A., 1999). The preexisting bibliography and the field works completed the materials used.

Figure 4 contain Carrascón headwater stream to ± 600 m. altitude and with NNW direction. At ± 500 m. a important direction change is carried out, changing its course to NE direction with a clear palaeovalley and stingy capture. In ± 470 of altitude existing a clear aluvial fan immersed in olive area cultivation. This geoecological situation with sediments and hidromorphic presence make impossible the cultivation development.

To remove this natural situation, a channel was build to connect this alluvial fan in the finish part of the stream with the initial sector of other smaller water course present in triassic plain and communal territory of El Salobral area (Fig. 5). Here a paleovalley at 470-430 m. altitude and a clear migration of drainage system to SE direction is very clear too. The new water stream created would be the valley of current Carrascón river.

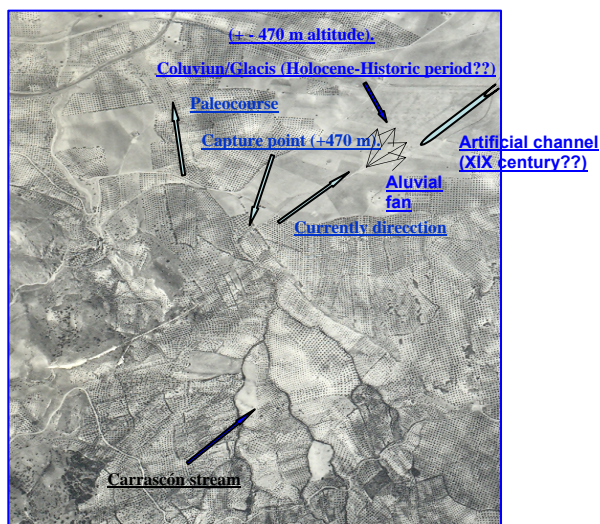


Fig. 4. Geomorphological interpretation of initial part of Carrascón stream

This artificial new situation provoked the formation of ±120 cm. thickness clayed sediments, no carbonate and illitic nature above the gypsum plinth. The permeability discontinuity existing between both materials to permit the formation of an underground water layer strongly saline (164 g/l) responsible during the dry winter and summer period of the water sheet small-lake ecosystem formation (±100 cm of depth).(Fig. 5).

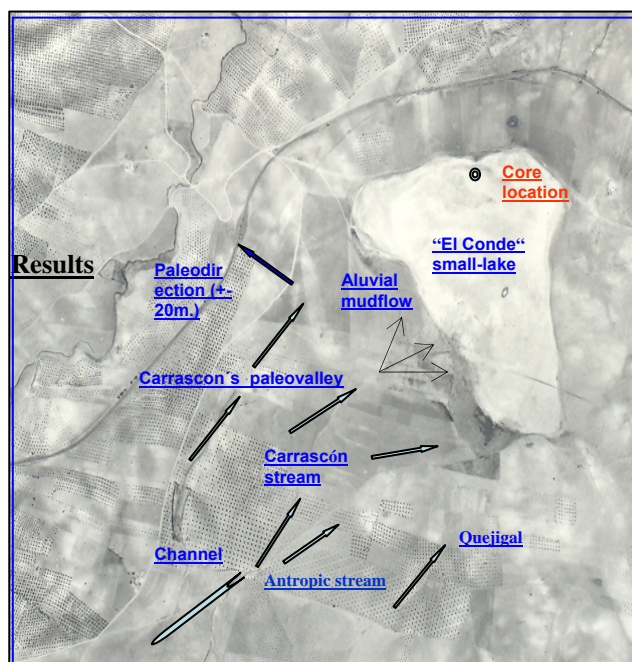


Fig. 5. Geomorphological interpretation of final part of Carrascón stream

Figure 6 summarize the physico-chemical characterization of this sediments in a core made in the small-lake bottom depresión (photograph, 1) (Figure 5). The chroma is indicative of this new situation too: grey in sediments by the hydromorphic situation, and white colours in gypsum lithology (Munsell colour, 1990). The X-ray diffraction shows the presence of smectites and illite minerals in sediments, and only gypsum in material parental.

Table II contain the analysis of this sub-surface water, with a very high concentration in salt dissolved derived by the evaporation-drained annual processes (Fig. 7).



Fig. 7. El Conde small-lake bottom during the summer period (salts deposit)

CONCLUSIONS

The search for a permanently solution to an agricultural problem in XIX century motivated the formation of the currently international *Ramsar* Reserve of El Conde small-lake. An ancient agricultural problem was transformed in a currently ecological advantage.

A natural evolution of drainage water network during holocene period represented an initial situation of important changes in the territory. Human activities were the final creative of the current landscapes.

With the new results obtained the ecological and hydrological functioning model of Moya (1988) must be changed.

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