



Interaction between a dam site and karst springs: the case of Supramonte (Sardinia)

J. De Waele (1)

Dipartimento di Scienze della Terra, University of Cagliari, Italy (geoam@unica.it)

Sardinia is one of the Italian regions with the greatest number of dams per inhabitants, almost 60 for a population of only 1.5 million people. Many of these dam sites are located along the main rivers of the Island and their waters are used for irrigation, industrial, power station, drinking and flood regulation purposes.

The dam *Pedra 'e Othoni* on the *Cedrino* river (Dorgali, Central-East Sardinia) is located immediately North of one of the most important karst domains of the Island, *Supramonte*. This carbonate massif, composed of Jurassic and Cretaceous dolomite and limestones overlying an impervious Palaeozoic metamorphic or granite basement hosts Sardinia's most important cave systems and represents a karst aquifer of regional importance (Cabras et al., 2002; De Waele J. et al, 2005).

Along the threshold of the Palaeozoic basement on the Northern border of *Supramonte*, water is forced to flow out of the system through several resurgences, the most famous of which is *Su Gologone* spring, a *vauchusian* rise declared Natural Monument in 1998 according to the Law 31/1989 for its value in the landscape and its hydrogeological importance (Bianco L., 1993; Sanna F., 1995; Sanna F. et al., 2002). The other main outflows of the system, *Su Tippiari* and *San Pantaleo* springs, are at present almost permanently submerged by the high water level of the *Pedra 'e Othoni* dam. The only spring used for water supply is *Su Gologone*, since the other two outlets are underwater, and at present an average of more than 130 l/s is conveyed into the aqueduct of Dorgali and Oliena run by the Consortium for the Aqueduct on *Rio Govossai*. In the near future water will be supplied also to other communities with a possible increase of water adducted from the spring.

The dam, originally meant to regulate the flooding of *Cedrino* river but actually used for all sorts of purposes (electricity supply, drinking water, irrigation of farmlands,

industrial uses), has a maximum regulation altitude of 103 m a.s.l., only slightly less than a meter below the *Su Gologone* spring level (103.7 m), and 3 and 8 meters respectively above the submerged *Su Tippiari* and *San Pantaleo* springs. During floods of the *Cedrino* river, occurring in average at least twice a year, also the *Su Gologone* spring becomes submerged by the muddy waters of the lake for a time ranging between a couple of hours up to several days, making water supply from the spring impossible. It is not quite clear how much this flooding has negatively impacted the karst drainage of the aquifer, but it has surely its important repercussions also on the inland underground drainage system. Unfortunately detailed studies on the behaviour of the springs and the aquifer is very difficult in the present situation, and the importance of such investigations is stressed.

This dam site is a good example of how an artificial reservoir, although placed outside a karst area, can however influence the karst hydrology and landscape in a more or less important way.

References

- BIANCO L. (1993) - *S.O.S. Su Gologone*. Sardegna Speleologica, 4, pp. 19-25
- CABRAS S., MURGIA F., SANNA L. (2002) - Complesso S'Edera-Su Gologone: tracciamento geochimica sulle acque sotterranee del Supramonte. Sardegna Speleologica, 19, pp. 18-24.
- DE WAELE J., SANNA F. & VIGNA B. (2005) - *Hydrogeological asset of the Supramonte region (central-east Sardinia, Italy): analysis of new data*. Geophysical Research Abstracts, 7, 08251
- SANNA F. (1995) - *Individuazione di importanti riserve idriche strategiche nel Supramonte di Oliena-Orgosolo-Urzulei (Sardegna centro-orientale)*. PhD, Facoltà d'Ingegneria, Politecnico di Torino & University of Cagliari, 212 p.
- SANNA F., VERNIER A. & VIGNA B. (2002) - *Le sorgenti di Su Gologone nel contesto della idrostruttura carbonatica del Supramonte: rapporti tra carsismo ed idrogeologia*. In DE WAELE J. Eds., Atti del Convegno "Il carsismo e la ricerca speleologica in Sardegna", pp. 29-46, Cagliari