

SPECIAL REPORT

Damned dams again: the plight of Portuguese rock art

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Portugal's most important rock art finds of the last three decades all have a rather unfortunate association with dam projects. Considering that there are hydro-electric and holding reservoirs on almost all the major rivers in Portugal, it was almost inevitable that rock art would be affected by some of these projects. The history of this association, which usually proved fatal for the rock art, is reviewed here. It provides a lesson to those trying to preserve rock art. Attention is given to the sociology of state-funded agencies charged with the protection of archaeological resources and rock art.

The Fratel dam on the river Tagus

In the early 1970s, a group of students from Lisbon University, alerted by a local ethnologist, found the Tagus valley rock art area (Serrão et al. 1972). Like all similar finds, the local population knew about the engraved figures before their 'discovery'. Although the group was searching for Palaeolithic sites, they soon knew that they had come across one of the most important rock art areas on the Iberian Peninsula — forty kilometres of river bedrock with tens of thousands of petroglyphs.

The Fratel dam flooded most of the engraved surfaces in 1974. Portugal was still a dictatorship then, so any notion of preventing the impending destruction was out of the question. Sponsored by the *Calouste Gulbenkian Foundation* of Lisbon, Eduardo Cunha Serrão and the students did what they could to record the site. They followed advice from experts of the time, such as Leroi-Gourhan and Emmanuel Anati, and made latex moulds of dozens of surfaces for future studies. These were still in reasonably good condition last time one of us (MSA) saw them in the National Museum of Archaeology in Lisbon.

A complete inventory on this material remains to be done thirty years later, perhaps due to its overwhelming quantity or perhaps because researchers preferred to squabble about chronology instead of providing empirical data. Based almost entirely on style, some writers suggest a long sequence starting in the Epi-Palaeolithic period (Anati 1974; Gomes 1987) while another propounds a shorter one, starting in the Bronze Age (Baptista 1981).

The Pocinho dam on the river Douro

Portugal freed itself from dictatorship in 1974 and blossomed into a full democracy in the 1980s. Even so, environmental impact studies continued to be very superficial and none involved a special archaeology survey. An important piece of news reached the academic world in 1981 — Susana Oliveira Jorge and a group of other archaeologists from Porto University published the 'horse' motif of Mazouco (Jorge et al. 1981). This engraved Palaeolithic-style figure (but see Baptista 1983: 63), located over a dozen metres above the Pocinho dam reservoir, had escaped the inundation.

When engraved rocks were found in Vale da Casa in 1982, the Pocinho dam was practically complete. Baptista's (1983) description does not make it clear how many rocks were flooded by this project.

The river Côa dam

The petroglyphs of Mazouco and Vale da Casa, 50 km apart, should have demonstrated an urgent need for an intensive survey of the area. Francisco Sande Lemos expressed this idea at the end

of the 1980s in a preliminary survey of the upper Côa valley (impact studies became compulsory when Portugal joined the European Union). His report noted the existence of four painted rockshelters and some petroglyphs and recommended further studies in the Côa valley area.

In late November 1994, the world was both surprised and shocked at news emerging about the Côa valley. Written evidence now confirms that some officials of the Portuguese Heritage Institute (IPPAR) and the state-owned electricity corporation (EDP) had already seen some of the engraved rocks in 1992. Knowledge of the rock art was not published or presented in any archaeological forum. The information remained concealed in internal reports of IPPAR while works for the Côa dam went ahead.

Recent history would have repeated itself had it not been for a campaign led by IFRAO members, with the extraordinary support of the international community and a Portuguese movement to oppose the dam (Bednarik 1995). Letters from around the world asked for an international commission to establish the dimension and importance of the finds. That pressure made a difference. Newspapers, magazines and TV disseminated images of the carved animal figures all around the world.

In the first months of 1995, local people led rock art researchers to a series of previously unknown finds, both within and above the intended reservoir area, as well as in the parallel valleys of Vale de Cabrões and Vale de Vermelha. By the end of the summer of 1995, fifteen sites with thousands of figures had been examined. It became clear that the Mazouco horse, the figures of Vale da Casa along with those of Siega Verde, a rock art site across the border with Spain, were just the tip of an iceberg.

In November 1995, a newly elected government suspended the Côa dam project and the valley became a park. However, subsequent developments disappointed the world community of rock art researchers. Controversies concerning the management of the park were reflected in reports of severely detrimental management measures (Jaffe 1996) and 'academic xenophobia' (Swartz 1997a; Swartz 1997b). Deposits were churned up haphazardly in a fruitless search for concealed petroglyphs, and engraved surfaces were scrubbed and cleaned with 'wooden tools and river water' (Zilhão 1996), and with chlorides.

Despite all these management shortcomings the Côa rock art area secured UNESCO World Heritage listing in December 1998, after the dam had been formally abandoned in June 1997.

The Laranjeira dam on the river Sabor

When the new Prime Minister, António Guterres, announced the suspension of the Côa dam in November 1995, he pacified dam lobbyists by saying that energy and water policies were not at risk. The Côa project was going to be replaced by the Laranjeira dam on the river Sabor. Already in mid-1995, i.e. well before the general election in October 1995, the construction authority had mentioned this alternative site to one of us (RGB). The Laranjeira project is part of a dam-construction strategy formulated roughly half-a-century ago, during the time of Portugal's dictatorship. According to government proposals, the project has a budget of around US\$210 million to build a wall 130-150 m high. By comparison, the Côa wall would have been 137 m high.

According to the impact study report (Coelho and do Rosário

Partidário 1999), several rock art sites are going to be destroyed if the Sabor dam construction proceeds. News of petroglyphs on the Sabor featured in a front-page headline on 28 June 1997 in the *Expresso*, Portugal's most important weekly newspaper. The headline, '*Barragem que substitui Cõa também tem gravuras*' ('Dam that substitutes the Cõa also has engravings') left no doubt that it is not scientific novelty alone that grabs attention (Jaffe et al. 1997).

Details in the press were contradictory. One article mentioned a single 'Palaeolithic-style' figure but João Zilhão, the President of the Portuguese Archaeological Institute (IPA), told the *Expresso* that 'several engravings' had been discovered, but said nothing about their style and possible chronology. The *Expresso* reported that the petroglyphs are identical to those of the Cõa, Mazouco and Siega Verde sites. In the *Público* the same day (28 June 1997), Zilhão said that, for now, the quantity and quality of the engravings cannot be compared to those in the Cõa valley.

We have no knowledge of any scientific report about the Sabor rock art having been presented anywhere, not even during one ideal opportunity — the 1998 IFRAO Congress held in Vila Real, Portugal. The few pictures published so far show preliminary but substantial earthworks in the dam construction area. The President of IPA and other officials confirmed that studies are being made in the Sabor valley and everything will be done to protect the petroglyphs. There is even talk of cutting engraved rocks and moving them to a museum in the nearby town of Torre de Moncorvo. This is reminiscent of the statements made by various state officials and politicians during the 1994-95 campaign to save the Cõa valley. Yet again the archaeological study by Ricardo Abrantes Teixeira and Miguel Aersa Rodrigues was made without any rock art specialist taking part. The non-technical report confirms the existence of several archaeological sites classified as being of exceptional cultural value. However, the full report made by *Ecosistema* and *Agrlpro Ambiente* states that 191 sites were located in the valley, of which 135 will be flooded.

On 7 March 2000, the *Público* reported that the Minister of the Environment is going to approve construction of the Laranjeira dam. According to the plan presented in 1997, construction should have started in 1999 and the reservoir should be full by 2005. The delay provides time to reflect. Environmentalists are opposed to the scheme. A now privatised EDP, the electricity corporation, may yet recognise the viability of alternative forms of energy rather than waste more resources on obsolete dam strategies. Perhaps proper studies can still be made in the Sabor valley, but it is not encouraging that there has been no response to a letter from the IFRAO Convener to the President of IPA (22 March 2000) asking for his assurance that he would safeguard the preservation of the Sabor rock art.

The Alqueva dam on the river Guadiana

A few years ago work on the Alqueva dam, on the southern part of the River Guadiana, began in earnest. No rock art would be submerged by this reservoir, according to António Carlos Silva, co-ordinator of the project's archaeology studies (part of EDIA, Empresa de Desenvolvimento e Infra-estruturas do Alqueva, SA). However, he also admits that there are several previously known or recently discovered engraved rocks in the area. We understand that most of these rocks are decorated with cupules. The dam will be completed in 2001 but archaeological studies and publication are expected to continue until 2003.

The project is partly funded by the European Union (ECU376.7 million, or 53.9% of the total expenditure), the remainder being provided by the national authorities, the private sector and other bodies. Each EU citizen will through taxes contribute about one Euro to the cost of the Alqueva dam — and thus to the destruction of one of Europe's finest concentrations of rock art. Moreover, the dam has been condemned as dangerous

and purposeless by all well-informed environmental NGOs (non-governmental organisations). The dam will inundate 250 km² in the Alentejo (southern Portugal) and Extremadura (Spain) regions, holding 4150 hectometres of water and irrigating 110 000 ha of land. It will be the largest European artificial lake, 80 km long and 96 m deep. The project was first mooted in 1952, when there was an intent of building a new industrial city. That city has never been built. The second aim of the original project was to intensively irrigate the Alentejo region, yet less than 40% of the irrigation projects already realised in the area are being used. The project's third aim was to produce electricity, yet the dam will contribute only 0.18% of the total Portuguese electricity production, and the system's pumping stations will consume more electricity than it can produce.

With the new availability of European finance, the project has been rekindled. All parliamentary political parties of Portugal support construction of the Alqueva dam, pointing either to the great development of infrastructures (680 km of main irrigation channels, 4400 km of secondary irrigation channels, 114 pumping stations, 1100 km² irrigated), or looking at the dam as a means of preventing emigration and helping poor farmers. The project has been approved by the European Union on 28 July 1997 (European Regional Development Fund Programme N. 97.12.09.001, period covered 1997-99), as a 'specific integrated development program for the Alqueva area (PEDIZA)'. It is listed as Priority 4 ('Strengthening the regional economic base') of the *Community Support Framework for Portugal (1994-1999 period)*. A second stage (ECU199 million) is already foreseen.

In 1997 the project met with fierce opposition from environmental organisations. Martin Hiller, WWF President, described the decision as an ecological catastrophe. He pointed out that the filling of the reservoir depends mainly on Spain, which controls most of the catchment areas, and it is difficult to think that in time of drought Spain would concede its water to fill a Portuguese dam. Despite all oppositions, and despite the fact that even in the European Commission doubts arose about the project, Mme Monika Wulf-Mathies, commissioner of regional policies, approved the European funding, assuring that all the preventative measures will be taken 'to save the environment'. How to save an environment while flooding it is, however, difficult to explain.

Environmental concerns

Strong concerns about the region's fauna and flora have been detailed and documented. Although the ICCRA (the Portuguese ministerial commission retained to manage the financial assistance of the Alentejo region) cites the importance of 'preserving and promoting the natural heritage by saving the natural environment with particular regard to the bio-diversity', the project does not comply with relevant directives. The Guadiana valley comprises four biotopes, of the total of nine recognised by the Habitat Direction of the European Union, that would be destroyed. It is the habitat of many threatened species (otter, white and black stork, Iberian imperial eagle — the latter two are threatened by extinction). It includes the second-largest western European colony of herons. Wolves, lynxes, turtles and cranes are among the other species whose habitat will be destroyed. The dam will greatly endanger 38 species of birds, 26 species of vertebrates and nine RELAPE ('Rare, endemic, localised, threatened with extinction') vegetal species. The Guadiana valley (corresponding to the border between Spain and Portugal) constitutes one of the most important south-western Iberian endemic Mediterranean forests. More than one million trees will be cut before filling the dam. This massive program of tree felling has already begun.

There will also be great effects on the valley below the dam, including a significant reduction of water flow, pollution by fertilisers and pesticides, and a projected negative impact on fishing and tourism. Concerning the planned irrigation, it is

important to note that the Alentejo soil is of poor quality and unsuitable for intensive agriculture. Water quality is appalling, and without subsidies profitable cultivation will not be possible — a problem already endemic in Europe's agriculture.

Legal concerns

Strong legal concerns are presented in the on-line site of ADENEX (<http://mastercom.bme.es/adenex>), a Spanish association defending the Extremadura natural environment. There are various irregularities in the evaluation of the environmental impact. It does not present any alternative for the siting of the dam, its technical characteristics and its volume. Of concern is the restricted competition to obtain recommendations regarding the environmental impact which allowed only nine days for submissions after the announcement was made on 25 January 1996, and two months for the study of the environmental impact. Is two months adequate for a project of such magnitude? The European Union directive (85/337/CEE 27.6.1985) states that the main reasons for a particular choice must be specified in the environmental impact study, and if no alternative tender is available the study risks being null and void.

Some irregularities are also evident in the way the study in the Spanish part was presented. Not one of the eleven volumes of the *Integrated study of the environmental impact of the Alqueva project* is specifically devoted to the Spanish section, so the minimal content rules for such a study were not respected.

Three European Directives appear to have been infringed: 79/409/CEE (bird protection), 92/43 (habitat conservation), and 85/337/CEE, which clearly specifies that any decision must be taken only after the impact evaluation, and not before. But a company, the EDIA (constituted by public capital), was specifically created by the Portuguese Government in 1995, based on works begun in 1976 and interrupted in 1978 — well before the presentation of the impact studies. Thus the impact study was purely a means of legitimising an already existing project.

Archaeological concerns

It did, however, result in a funding bonanza for Portuguese archaeology. Five million euros were granted, and a public competition was open at the end of 1996 to appoint collaborators. The deadline to complete the 'minimisation' of the impact on archaeological sites was three years, i.e. at the end of 2000. Each part of the project was conducted under the direction of a Portuguese archaeologist. Some 300 archaeological sites were examined (Silva and Lanca 2001) and the project was divided into sixteen geographical and chronological areas. The intervention plan consisted of surveying, excavating and studying, while the publication of data will commence in 2002. The main archaeological features are Xerez cromlech, which was excavated and transferred, and Lousa castle, a fortified building of the 1st century B.C., absolutely unique in Portugal. This castle will remain where it is.

The disturbing fact is that the public company responsible for the building of the dam also co-ordinates the archaeological work. Concerning the rock art, a new international campaign is gaining momentum, but the situation is far worse than that of the Cõa rock art area during 1994-95. During the 4th Prehistoric Art Course, held at the Instituto Politecnico de Tomar in March 2001, the discovery of a very important rock art area at Molino Manzenez (Manzenez mill, Cheles, Badajoz de la Frontera, Spain) with hundreds of engraved rocks was announced. The first impression of many rock art scholars was that the Portuguese side of the project area should also have significant rock art presence. The Spanish complex was studied in the first months of 2001, under the aegis of the EDIA, by a Spanish team of fifteen archaeologists directed by Hipólito Collado Giraldo of the Archaeological Museum of Badajoz. More than 100 engraved rocks have been found. As most surfaces are covered by lichen, many other

engraved rocks are probably present. The entire complex shows clear connections with the Tagus valley rock art, submerged as mentioned above by the Fratel dam in the 1970s.

The fate of the Guadiana rock art

At the end of April 2001, the existence of a ten-km-long rock art area on the Portuguese side was disclosed by an environmental NGO, the LPN (Liga para a Protecção da Natureza), after receiving an anonymous tip-off. A Portuguese archaeologist, Manuel Calado from Lisbon University, immediately surveyed the area. Many other complexes are probably present (Tracce 2001).

Just two years before the 1996 formalisation of the Alqueva project, the Cõa case was exposed by IFRAO, which not only led to the protection of the valley by a UNESCO declaration and the establishment of the Cõa Park, but also caused structural upheaval in Portuguese archaeology. It resulted in the break-up of the agency responsible for the cover-up, IPPAR, and the creation of IPA (Institute of Portuguese Archaeology) led by João Zilhão and of CNART (National Centre of Rock Art) led by Antonio Martinho Baptista. So why did neither IPA nor CNART undertake rock art-related research in the area to be inundated, although such a presence was highly probable, as publicly admitted by Zilhão on 27 April 2001? As the main goal of CNART is to study and to preserve Portuguese rock art, why was no survey undertaken in order to establish the presence or absence of rock art? And why, after the painful experience of the Cõa, did the environmental impact study not include the requirement of a rock art survey? Are we to understand that an intensive survey of more than three years by the country's most eminent archaeologists failed entirely to notice the substantial corpus of Guadiana petroglyphs? The IPA claims that there are some 100 people working on the archaeological survey, so it is reasonable to ask why this rock art was found by amateurs of an environmental NGO four months after the deadline of completing the survey, which was begun in the 1980s. Zilhão has volunteered an explanation: perhaps the petroglyphs were covered by river sand (!). It still does not explain why the country's authority for the preservation of rock art never even set foot in the Guadiana valley since the survey work first commenced well over ten years ago. The IPA also claims to have unsuccessfully asked the EDIA three times during 2000, i.e. years after the completion of the impact study, to conduct a rock art survey. Are we to understand that the Portuguese government authority charged with the protection of the country's rock art asked a private construction company to conduct a rock art survey five years after the impact study?

Once again, Portuguese rock art risks becoming underwater rock art, as did the Tagus rock art and that on the Douro. Once again Portugal's public agencies responsible for the protection and management of the country's rock art heritage have failed in their constitutional duties and it is left to an international NGO, IFRAO, to expose these damning circumstances and to secure the survival of the rock art. IFRAO immediately responded to the report of the Portuguese Guadiana petroglyphs by forming an international commission to evaluate the entire issue and to promote a complete and exhaustive study of the area.

This Portuguese experience offers valuable lessons, because the nexus of political currents and rock art management has implications around the world. Until 1995, rock art protection in Portugal was administered by the state's authority, IPPAR, which failed severely in its duty. This organisation managed architectural heritage properties as well as archaeological sites, and was dominated by architectural administrators serving the needs of tourism. Rock art was of such low priority that the destruction of countless sites was routinely approved by the state.

Thus the complicity of state-administered heritage man-

agement in the destruction of rock art has been endemic in Portugal for several decades. The number of sites that fell victim to this form of 'site management' can only be conjectured, but it is certainly substantial, and at least in the hundreds. As a consequence, a large part of the country's rock art has been allowed to be destroyed by the state-appointed protectors of this irreplaceable heritage. With the recent establishment of IPA and CNART it was thought that the phase of deceptive practices had ended, and that a new and responsible era had replaced it.

Conclusion

Rock art represents an irreplaceable cultural heritage, and the state is not necessarily its most ardent protector. Independent, preferably international peer review is essential. Perhaps it could be argued that international rock art scholars should not concern themselves with what happens to Portuguese rock art. But firstly, the Portuguese public deserves to be independently advised about the performance of its own public servants, particularly in circumstances that may give rise to serious questions; and secondly, the rock art of Portugal is not the property of Portuguese state administrators of rock art management. It is the property of all of humanity — past, present and future. It is to be treated as such, and not as a hostage of an inexperienced, secretive and deceptive technocracy.

Another lesson from the Côa controversy was that 'the political nature of the archaeologists' strategy influenced their scientific discourse' (Gonçalves 1998: 18): to preserve their claim that the rock art is of Palaeolithic age, they tied its preservation to this age claim, and in fact demanded that it must be preserved *because* it is of Palaeolithic age. This was a fundamental error of strategy in several respects. First, the Palaeolithic age was far from demonstrated, consequently it was unwise to base a demand for preservation on it. Second, such an equation would prejudice demands for preserving Holocene rock art elsewhere. Third, the argument that Holocene rock art is somehow less deserving of preservation is emotive rather than rational, and certainly subjective. It is likely to be contradicted by many stake holders in rock art, such as indigenous custodians in other world regions, or researchers specialising in periods other than the Palaeolithic. It follows that the strategy Gonçalves examines was not only politically motivated, it implies inexperience and a lack of consideration of the wider and long-term ramifications. Already the very argument has been mentioned that the Guadiana rock art is not of sufficient value to warrant preservation 'because it is not Palaeolithic'.

There are further fundamental lessons for heritage site management to be gleaned from the circumstances surrounding the saving of the Côa rock art. When a cultural resource management agency with a long history of neglecting its duties was publicly exposed, this led to swift public reaction, but only to cosmetic changes to the offending agency itself. In a healthy democratic system, state technocracies can be subjected to effective criticism, but that does not necessarily entail their ultimate accountability. Indeed, the brazenness of the establishment in the Portuguese example even suggests that such agencies are well aware of their immunity, and what is quaintly defined as 'the will of the people' is of little concern to them. To them, a public controversy on the scale of the Côa issue means little, and as soon as matters have calmed down business returns to the usual format. This is not only disturbing in the political sense, in terms of the cynicism implied, it also indicates that the protection of the CRM estate cannot be expected to be guaranteed by a technocratic system whose ultimate primary concern is its own well-being. We suggest that the Portuguese example shows that it would be a great improvement if such agencies were subjected to monitoring by an independent entity. Such an independent audit would have prevented the excesses documented in Portuguese rock art 'site management'.

REFERENCES

- ANATI, E. 1974. Incisioni rupestri nell'alta valle del Fiume Tago, Portogallo. *Bollettino del Centro Camuno di Studi Preistorici* 12: 156-60.
- BAPTISTA, A. M. 1981. *A Rocha F-155 e a Origem da Arte do Vale do Tejo*. GEAP, Porto.
- BAPTISTA, A. M. 1983. O complexo de gravuras rupestres do Vale da Casa (Vila Nova de Foz Côa). *Arqueologia* 8: 57-69.
- BEDNARIK, R. G. 1995. The Hell's Canyon saga continues. *Rock Art Research* 12: 70-72.
- COELHO, R. and M. DO ROSÁRIO PARTIDÁRIO 1999. *Estudo de impacte ambiental do aproveitamento hidroeléctrico o Baixo Sabor*. CPPE Companhia Portuguesa de Produção de Electricidade, SA.
- GONÇALVES, M. E. 1998. Science, controversy and participation. The case of the Foz Côa rock art engravings. *Journal of Iberian Archaeology* 0: 7-31.
- JAFFE, L. 1996. Systematic vandalism and improper conduct in the Côa valley rock art area. *AURA Newsletter* 13(2): 12-13.
- JAFFE, L. and M. SIMÕES DE ABREU 1997. Rio Sabor rock art discovery (Trás-os-Montes, Portugal). *Tracce* 9: 28.
- JORGE, S. O., V. O. JORGE, C. A. F. DE ALMEIDA, M. J. SANCHES and M. T. SOEIRO 1981. Gravuras rupestres de Mazouco (Freixo de Espada à Cinta). *Arqueologia* 3: 3-12.
- GOMES, M. V. 1987. Arte rupestre do Vale do Tejo. *Arqueologia no Vale do Tejo*, pp. 26-43. IPPC, Lisbon.
- SERRÃO, E. DA CUNHA, F. SANDE LEMOS, J. PINHO MONTEIRO, M. DE LOS ANGELES QUEROL, S. RODRIGUES LOPES and V. OLIVEIRA JORGE 1972. O Complexo de Arte rupestre do Tejo (Vila Nova de Rodão - Nisa). Notícia preliminar. *Arqueologia e História* 9(4): 349-97.
- SILVA, A. C. and M. J. LANCA 2001. *Alqueva, 4 Anos de Investigação Arqueológica*, Alqueva, 3º colóquio de arqueologia, E.D.I.A., Mourão
- SWARTZ, B. K. 1997a. An evaluation of rock art conservation practices at Foz Côa, northern Portugal. *Rock Art Research* 14: 73-5.
- SWARTZ, B. K. 1997b. An investigation of the Portuguese government policies on the management of the Foz Côa sites. *Rock Art Research* 14: 75-6.
- TRACCE 2001. Special issue devoted to the Guadiana rock art, No. 13, April 2001. (<http://rupestre.net/tracce/13>)
- ZILHÃO, J. 1996. Letter to the President of IFRAO, 26 August.
- Newspaper articles (by date of the publication)**
- Expresso*, 28 June 1997. Barragem que substitui Côa também tem gravuras (front-page).
- Público*, 28 June 1997. Gravura do Paleolítico no Sabor, by Pedro Garcia.
- Público*, 29 June 1997. Faltam os estudos arqueológicos, by R.F.S.
- Diário de Notícias*, 29 June 1999. Achado do Paleolítico no vale do rio Sabor, by Maria João Pinto.
- Visão*, 03 July 1997, Gravura no Sabor.
- Tal e Qual*, 4 July 1997. Agora é o Sabor Paleolítico.
- Expresso*, 29 July 1997. Barragem do Sabor em debate público by Mário de Carvalho (p. 19).
- Expresso*, 11 July 1998. Anúncio do Forum Baixo Sabor (advert).
- Expresso*, 1 August 1998. Barragem alternativa a Foz Côa já não será construída (front page and 2 supplement pages 1 and 3), by Pedro Almeida Vieira.
- Expresso*, 1 August 1998. EDP vai prescindir da barragem do Sabor.
- Público*, 7 March 2000. Sócrates dá luz verde à barragem do Sabor, by Pedro Garcia.

