PROTECTION OF ARCHITECTURAL HERITAGE AGAINST EARTHQUAKES

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COULD WE TALK ABOUT AN ANTISEISMIC CULTURE IN ANTIQUE SOCIETIES

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We know well witnesses of ancient Greek people about disasters bred by earthquakes (earthtremors, eruption of volcanos...) and interpretations deduced from them. For over a century, philologists and naturalists have collected and used them to understand history of earthquakes, natural sciences and theories of historians. Nevertheless, today we can take one step forward another way by considering these witnesses as signs of empiric but inquestionable and consequent culture of ancient communities as a whole. This change of point of view is due to a more systemic use of social science methods, by a more anthropological approach to witnesses, by the expression of archaeological methods in newfields like environment and human behaviors.

Then, what we could call antiseismic culture defines itself as the whole answers that men gave in order to survive, to resist and to protect themselves from natural phenomena, which were threatening them. There are different ways to analyze answers whose results get organized in a whole according to a systemic approach, whose general outlines can be under mentioned.

1) KNOWLEDGE OF EARTHQUAKES IN ANCIENT COMMUNITIES

The first research aims at languages: words and expression describing earthquakes can be read in homeric poems, that is at least, as long ago as the 8 th. century B.C. The Ancients used terms referring clearly to telluric phenomena in typhoon of all areas, form Asia Minar to Sicily and Great Greece. It is not only names but also meanings which give to scholars (researchers) new information about how the Ancients were conscious of seismic phenom, how they discerned them and appropriated their demonstrations in landscape.

Mythology is playing the same role in these communities and analysis of legends add significant elements to our knowledge. Thus we can see the distribution of worship places devoted to goods like Poseidon, Hephaistos in different regions, (for example Poseidion Petraios in Thessalia). Analysis that I have done about myth in relation to drying Thessalian plain shows that, out of every chronological reference form a geomorphological point of view, it did exist, in this region, a continuous and consistent tradition related to ground motion whose effects could be felt on the spread of stagnant waters and courses of rivers.

We are closer to our own conceptions when we analyze scientific writings of ancient naturalists and physicians. Therefore we note that scientific observations on earthquakes have started since the 6 th. century B.C., particularly with scholars in Western Anatolia (Ionia). And less than a century later, the first rationalist explanations of phenomena can be observed in writings of the Greek historian Heradotus, for example talking of Thessalian legend above mentioned.
2) ESTIMATION OF THE RISK

As part of a systemic research on antiseismic culture of ancient communities, we also have to pay attention to communities' behaviors themselves. History of catastrophes and earthquakes doesn't just reveal events but also informs us about human reactions: destructions of buildings, of houses and historic buildings, number of victims, deaths and injured people, fear close to panic... We perceive quite well than communities endures disasters and brought about answers, just like we can do today.

We can also understand differences and resemblances of behavior, compared with ours. So, for example, calls for help, requests for assistance and how they managed it are well known thanks the ancient authors. We can cite as typical one of the historian Polybios famous pages, historian describing earthquake's consequences in 219 B.C. at Rhodos and the help coming from antique cities and kingdom of all the inhabited world in this time.

Preventive and safety measures improved by ancient communities to provide themselves against disasters have been less often studied but did exist. We can distinguish in several cases the risk's grade taken on by communities or authorities. The most straight and simples measure was obviously to choose between deserting or staying in the threatened site in spite of risks. It appears that it's often the second solution which is adopted for many reasons. But it's food for thought compared with our own behaviors, we Moderns: rationalism of experts or authorities leads to prescribe the desertion of threatened places and to consider as sentimental and irrational the often expressed will of communities to stay put.

We known also, strictly speaking, the preventive measures either through texts or very often through archaeology. Thus we can analyze technical devices used by architects to rebuild broken monument or to erect a new one from top to bottom in a site or town known to be subject to frequent earthquakes, for example the temple built by Hadrian in Cyzicus. Contributions of archaeologists and architects are here essential to analyze antique monuments. But it's not a question of considering great sacred and historic buildings, temples, porches, walls. Ordinary residences were also strengthened or used appropriate technical proceedings. Around the beginning of the first Century A.D. it is already confirmed in a text of the geographer Strabo: when he talks about Philadelpia of Lydia, he states: "here, earth shakes so often that inhabitants have developed special techniques to build their houses."

3) BENEFITS EXPECTED FROM THE ANALYSIS OF ANTISIESMIC CULTURES OF ANCIENT COMMUNITIES

A certain number of results can be expected from an analysis of traditional communities' behaviors in seismic zones:

- a) a better knowledge of historic buildings, of constructions and sites continuously preserved by communities. At first, the specific purpose is to give useful information for restoration and maintenance of historic edifices or traditional residences through the acute knowledge of constructive techniques with their reuse and readjustment. That is, of course not question of excluding rules and modern methods of analysis, defined by engineers. But it's clear that a great deal of these methods can be applied carelessly neither to ancient monuments, nor to tradition's buildings, experts do know it. In many cases, convinced that our knowledge is better than an predecessor's, experts have no consideration for technical choices taken by builders themselves. However, our engineers should first admit that the edifice they have to restore or protect has survived more than any of our modern buildings.
did, owing to arrangements made by builders. We have to remember that ruins are less often the result of a succession of natural disaster than the result of men, by lack of mainteince or by pure and simple convenience and interest. For example, the Cyzique temple I was talking about few minutes ago, had been destroyed because it had been used as a quarry for several centuries and we make sure of that by traveller's witnesses who saw still standing twelve or fifteen centuries after its building. This kind of examples abounds all over mediterranean regions.

b) So we have to know human behaviors in addition to buildings' behavior. Knowledge of these behaviors could be globally obtained by systemic approach. It treats as a whole the natural phenomena and human acts referring to it. It also points out that in this system, relations between the two main components, the way of looking at physical phenomena, conceptions and rules managing human communities can have different values and organize themselves in several ways, and our modern conception of dealing with these problems is only one of these ways. I have already told that old communities did'nt really care about economic primacy, analysis of cost and profits but were interested in social organization criteria, in relations between communities (public and private sectors, citizen and foreigner, etc.) at last but not least in empiric criteria of what we could name "ergonomics", whose basic rule is this one: in a determined environment, to minimize disadvantages and to be optimist about advantages, according to material resources and efforts done by every community. The survey of variations in a such system, according to ages and regions must become a fundamental eleifient of authorities and operators' training, people in charge of cultural heritage built all over the different countries confronted with problem.

c) In order to improve this field, it is necessary to call on multidisciplinary teams' services: not only engineers and experts in parasiesmic buildings and structures but also philologists, archaeologists for history of monuments and constructive techniques, historians for analysis of witnesses and restoration of human acts, structures and organization of communities.

On the other hand, there is no time for hesitation concerning a long term work: history of social organizations, kingdoms, empires, republics. Communities have been holding for centuries, going through historical events and catastrophes. They're going on, getting effectively knowledge by empiric ways, from disasters to disasters, from earthquakes to earthquakes, they're always testing their technical methods, their psychological reactions and preventive measures they're compelled to take. That is exactly this acquired knowledge we call antisiesmic culture in traditional communities.

We have also to note that there is no shortage of information even if every specialist considers that the closely allied disciplines seam to provide few information, unsuitable for it own needs. For example, expert in seismology will establish historical lacunas concerning earthquakes in former times because more one goes back to ancient times, more historical sources become scarce. But a lot of information could come from others fields, like archaeology or architecture. It is advisable to work together, and that is in the research scheme I'm in charge of, the archaeologist join each other to reconstitute the movements and rises in waters in Central Thessalian basin, history of its rivers and lakes contributing to the history of active faults in this region for the past 3 thousand years.