

# Strategy for Protection of Cultural Heritage Exposed to the Natural and Man-Made Activity Disasters in Serbia

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**Abstract:** Natural disasters and the adverse human activities are the key events in the history of mankind that form our history and shape our collective memory to this day. People on the planet Earth are not obsessed only with natural hazards, caused by earthquakes, floods and volcanic eruptions, and troubles unlikely come solely from the action of nature. Disasters threatening the human race can be caused also by people themselves. Both types of disasters cause vast human suffering, at the same time destroying cultural heritage as well, that has the function of determining the identity of social communities. These sufferings should be added to those that can be determined only by in-depth analyses which are derived from the synergy of natural forces and mistaken choices made by the humans, when it comes to their habitat. The proposed strategic plan for protection of built heritage in emergency situations may become the powerful catalyst for the process of revitalization by which the social tissue of community is maintained and restored, creating the symbol of resistance by which it endures each and every natural element and evil men behaviour.

**Key words:** Natural disasters, protection, cultural heritage, hazards.

## 1. Introduction

Our buildings, historic and natural areas speak for the environment where we live, work and enjoy ourselves. All of them are the constituents of our heritage, which have the significant role in maintaining the quality of our lives and contribute to cultural, social and economic welfare of the community. A series of influential factors acts so that the problems of various importance, from general to regional and local ones, are clearly noticeable in the sphere of concern for cultural heritage, while in some segments they are partially hinted. They may be grouped into the problems, which refer to the condition of cultural heritage from physical point of view, the status of cultural heritage taking part in the culture, the status of cultural heritage participating in the State, namely political relations of the country, the legal status of cultural heritage, treating the cultural heritage all through spatial, master and rural planning in specific communities and institutions [1].

Natural and man-made disasters are especially dangerous when built heritage is exposed to them. In such a case, any plan must follow the international recommendations, such as the one prepared by UNESCO (United Nations Educational, Scientific and Cultural Organization). This kind of Disaster Plan usually involves four phases: (1) Prevention, (2) Preparedness, (3) Response, and (4) Recovery. The UNESCO guide to producing a Disaster Plan outlines recommended action in all four phases, but stresses out that the prevention is the best protection against disaster, natural or man-made.

In the SWOT (strengths, weaknesses, opportunities, and threats) analysis performed during the preparations for 2009 and 2010 Spatial Plan of the Republic of Serbia it was concluded that one of the most obvious weak points within our cultural heritage is the lack of global strategy in conservation, development and use of the built heritage. One portion up to the present omissions was eliminated by the guidelines provided

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for the Spatial Plan of the Republic of Serbia adopted in November 2010. However, the opportunity was omitted to introduce into respective strategy the commitment to producing the standardization processes that should be applied in protection and restoration of built heritage endangered by natural and man-made activity disasters. In the view of several decade long experiences of unpleasant surprises due to both types of disasters endangering the cultural, listed heritage among other buildings, it is obvious that particular care should be taken while complying with the standard procedure, and excluding the ad hoc decisions [2].

The Law on Emergency Situations of the Republic of Serbia was enacted in December 2009 and the National Strategy for Protection and Rescue in Emergency Situations was passed in November 2011. By careful analysis of these two governmental documents it may be observed that the listed built heritage is neither separated from other buildings by any priority in the sense of preventive protection nor by making them safe after occurrence only of natural disaster. The manner of preventive protection and rescue of mobile cultural heritage (museum objects, collections, archives, old books and films) is only extensively elaborated therein. Man-made activity disasters and their consequences are not yet taken into account in such a way.

It is, therefore, indispensable to study foreign

practice and propose the Management Plan for Emergency Situations in Protection of Cultural Heritage [3]. It has to be a layer-defined strategy, which encompasses the competences of the State and local governments, and should assist and encourage the efforts in preventive preservation of cultural and natural heritage as well as their restoration after natural disasters. In spite of current efforts to treat the cultural and natural heritage in an integrated manner, this paper considers only the cultural heritage backed by a series of recommendations and actions, which should assist in eradication of natural and man-made disaster consequences in the most expedite and efficient way.

## **2. Patterns of Natural Disasters and Types of Damages**

Based on various statistical data originating from the countries of European Union, the countries of Asia, South and North America, a list of natural disasters has been made, and they are ranked per relative frequency and extent of damages to cultural heritage [4-7]. First place is assigned to earthquakes, and then it is followed by floods, hurricanes, typhoons and cyclones mutually united, further on by landslides, storms, tornadoes, tsunamis, and finally the volcanic eruptions [8]. Nowadays, these classic patterns of natural disasters are also supplemented in some countries by climate changes as the global form of aggressive natural effects. In some regions, the fires caused either by lightning



**Fig. 1 (a) Church in Grabovo; (b) the bell tower was destroyed by stormy wind in 2009.**



(a)

(b)

**Fig. 2** (a) Belgrade fortress rampart between Barutana/Powder magazine/and Mračna kapija/DarkGate: the points of permanent landslide.



(a)

(b)

**Fig. 3** (a) Supporting wall of Monastery Beočin towards the hillside of MT Fruška Gora, being preserved and restored since the times of its construction. The monastery is built in an area known for ages as potential landslide.

or by increase of average temperatures and by long-lasting high temperatures may be ranked in the group of natural disasters. Nevertheless, there are various standpoints on that subject matter because the climate changes are caused to great extent by long-lasting acts of people through various forms of everyday life, among other things.

These patterns of natural disasters do not equally spread in all areas of the Earth nor are the character of damages with the same one. During some disasters, the damages are immediate and abundant extending to destruction effects, and in the case of other types only some parts of the buildings are affected, while others suffer minor damage. In both cases, the awareness is essential that invaluable heritage is subjected to destruction, and relevant authenticity is one of its fundamental values.

Based on available examples and practical experience numerous classifications of damages have been produced, including the link between the cause of occurrence and form of damage that has been established. It is possible, founded on such knowledge, to propose the measures by which the causes should be evaded as well as render the measures of rehabilitation. Per rule, the causes of damages differ very much, but the damages may be rather similar, thus the very task is highly sensitive. Classification of damages is drawn up based on several aspects, per type of cultural property, per type of construction materials and per type of structural assemblage. These divisions include all kinds of cultural heritage, sacral, profane, military and engineering because the performances of material and structure are the same or similar, no matter to functional division.



Fig. 4 Non-regulated torrential river in the centre of Valjevo town endangers the church and long-lasting flood of 2005 destroyed permanently the protected street row of village houses in Jasa Tomic, the Vojvodina Region.



(a)

(b)

Fig. 5 (a) Lightning lit the Catholic Church in Apatin (<http://www.svevesti.com/a206202-grom-zapalio-katoli%C4%8Dku-crkvu-u-apatinu>); (b) Historical building exposed to fire caused by lightning strokes: the example from Kuršumlja.

The Republic of Serbia Applicable Law on Cultural Assets from 1994 defines four kinds of immovable cultural assets, such as: archaeological sites, spatial-based cultural and historic entities, cultural monuments and famous places. Natural disaster affects diversely these four kinds of cultural assets, and, therefore, the damages are of various scopes and occur in different parts of the buildings. Archaeological sites are further divided per type of the findings, such as prehistoric, classic, early medieval and medieval ones. Per rule, the prehistoric sites are protected by layers of soil or are preserved up to their certain low height.

They are, therefore, affected primarily by floods, further on by fires, landslides and less by other natural elements. They may be also devastated by earthquakes to greater extent, but only if allocated in very close vicinity to the epicenter of such impacts. The classic, early medieval and medieval archaeological sites may be well preserved up to great height of edifices. In such case, they share the destiny of other protected kinds, i.e. of cultural monuments. Cultural monuments are the edifices dating from diverse periods of time; they are made out of different materials and structural assemblage and are, therefore, exposed to all types of

natural disasters. In general, they become more affected than contemporary ones due to lack of elements nowadays built-in to secure the buildings from natural elements. It is similar with famous places that encompass individual edifices, which are also exposed to the same shape and power of natural elements. The greatest extent of damages, considered simultaneously as the most complex one, occurs during natural disasters affecting the spatial-based cultural and historical entities. They cover major number of edifices, which are frequently of monumental size, and allocated within different urban or rural configurations.

Bad weather conditions may be concentrated either to small areas or may affect entire countries and regions. No matter to which extent they are expressed to, they are destructive for people and communities. For this reason, it is required to develop the plans for protection of cultural heritage, which will be assigned to all levels so that the community could be prepared for diverse types of danger caused by natural disasters as well as for efficient activities that rescue, protect and restore the heritage.

### **3. Man-Made Activity Disasters**

Natural disasters and the adverse human activities are the key events in the history of mankind that form our history and shape our collective memory to this day. People on the planet Earth are not obsessed only with natural hazards, caused by earthquakes, floods and volcanic eruptions, and troubles unlikely come solely from the action of nature. Disasters threatening the human race can be caused also by people themselves. Both types of disasters cause vast human suffering, at the same time destroying cultural heritage as well, that has the function of determining the identity of social communities. These sufferings should be added to those that can be determined only by in-depth analyses which are derived from the synergy of natural forces and mistaken choices made by the humans, when it comes to their habitat. Poor positioning of dams, poor

choice of structure orientation, poor choice of construction materials (immediately inducing greenhouse effect), and raising cities in flood or earthquake prone terrains throughout the history of civilization pose risks hanging as a Damocles sword both over the settlements' physical structure and their inhabitants' subsequent generations who inherited life of insecurity.

Based on historical experience, all the above cases share the following three key words: prevention, strong interpersonal cooperation and priority in saving people and cultural heritage to which people are the most attached to.

Historical experience points to the fact that some societies are better prepared for mitigating the impacts caused by the nature and the adverse human activities, while others are exposed to great suffering and a long, uncertain recovery. As suggested by extensive research, some societies cope with difficult situations more quickly and efficiently, i.e. they have specific and well developed strategies. These strategies, relating primarily to preventive measures, could be developed by the state, local government or individuals. There are two types of protection measures: direct measures of providing public resources and indirect measures of educating people how to protect both themselves and cultural values. Historically, these examples are few, but they are a real challenge for modern society to reach and possibly outmatch them.

Human activities exerting devastating effects on the cultural heritage can also be systematized by the scope of damage they cause.

- (1) Terrorism, caused by various factors, among which the most important are ideological and religious conflicts, which result in devastation and destruction of buildings due to exclusivity;
- (2) The advancement of war technology—complete destruction of buildings;
- (3) Wars and revolutions—demolition, removing materials and intentional damage;
- (4) Toxic industrial accidents, which can completely

demolish the physical structure of cultural monuments;

(5) Vandalism—removing materials of which cultural heritage is constructed and their misuse by insertion into surrounding buildings, paving using tombstones, destroying the frescoes and other types of wall surfaces by lighting candles and the like;

(6) Exploitation of natural resources;

(7) Opening mines, quarries, oil deposits—pollution, landscape changes, soil subsidence, structural distractions caused by vibrations, changes in the groundwater regime;

(8) Agriculture—the prevailing cause of destruction of archaeological sites;

(9) Superstition—damage caused by palpation of buildings or statues, healing power of the eyes of saints, notching or destroying texts;

(10) Modern industrialization and construction of large industrial facilities;

(11) Hydraulic engineering and irrigation systems;

(12) Construction of telecommunication, electrical and nuclear facilities.

In all presented cases, the extent of disruption of the physical structure ranges from the threatening distraction of structures and general degradation of their spatial organization, through total destruction of building and its surroundings performed by humans.



**Fig. 6** Albanian terrorist attacks of 17 to 20 March 2004 destroyed the valuable churches, wall paintings and the whole monastery complex.



**Fig. 7** Burning of Saint Sava church in Kosovska Mitrovica in 2004 by Albanians and Bajrakli mosque in Belgrade in 2005 by Serbs.



**Fig. 8** One of the buildings of the Ministry of Internal Affairs of Serbia and the barracks in Zemun were destroyed by NATO (North Atlantic Treaty Organization) bombing in 1999.



**Fig. 9** Vandalism—frescoes threatened by leaking caused by theft of copper roofing and wall paintings destroyed by burning candles.



**Fig. 10** Open pit mine in Kostolac which directly threatens the Roman ancient settlement Viminacium.



**Fig. 11** Floods and constant rising damp in the village in the southern Banat as a result of the construction of a dam on the Danube river.

#### **4. Management Plan for Cultural Heritage in Emergency Situations Affected by Natural and Man-Made Activity Disasters**

The Action Plan encompasses two problems. The first one refers to official framework of the operations based on local, regional and governmental management systems applied in emergency situations. In majority of countries such form of operations is also supported by the plans, which involve the rescue and restoration of cultural heritage. However, the contribution of the conservationists is insufficiently present while producing such plans. Our legislation focuses on rescue of mobile cultural property, museum collections, archives, library and film resources, while stationary cultural property is mostly treated as the constituent of total construction fund. Protection and security of immovable cultural heritage depends most frequently on promptness the individuals and local community will respond to. This may be checked by the examples of heritage restoration works as the consequences of historically recent earthquakes, which stroke Mionica in 1998 and Kraljevo in 2010. The Assistance Plan for Cultural Heritage of Mionica, namely the Kolubara region has not been fully envisaged yet, and, therefore, it could not be put into operation. On the contrary the Žiča Monastery, close to Kraljevo, damaged in 2010, has suffered minor damages, which was rehabilitated by immediately produced operational plan.

The second problem refers to low or incomplete experience of professional conservationists in protection of cultural heritage during emergency situations. They are insufficiently trained to act in such conditions, namely in the process of rescue and restoration of the heritage. Therefore, they should be timely prepared by professional organizations and should actively participate in creating rescue strategy for the heritage in emergency situations, bearing the portion of responsibility for their quality and efficiency when their presence is required.

In normal conditions, the work of conservationists is directed towards protection of slow, however, inexorable hazards, which threaten the historical edifices, and it is not aimed to eliminate the consequences caused by catastrophic events. In the events of natural disasters, all Services are primarily directed to rescue human lives and basic properties as well as to rapidly and efficiently provide food, shelters and medical aid. Historically built heritage has the secondary priority. In well envisaged Action Plan and by coordinated efforts, the conservationists may develop the proactive and efficient activities that render significant benefit to the entire community.

In laying down the standardization of preventive measures and action plans as an integral part of Management Plans for emergency situations in protecting cultural heritage there is a series of problems among which one refers to the similarity and uniformity of



Fig. 12 Earthquake consequences in the villages accommodating the traditionally built old houses in vicinity of Mionica in Serbia.

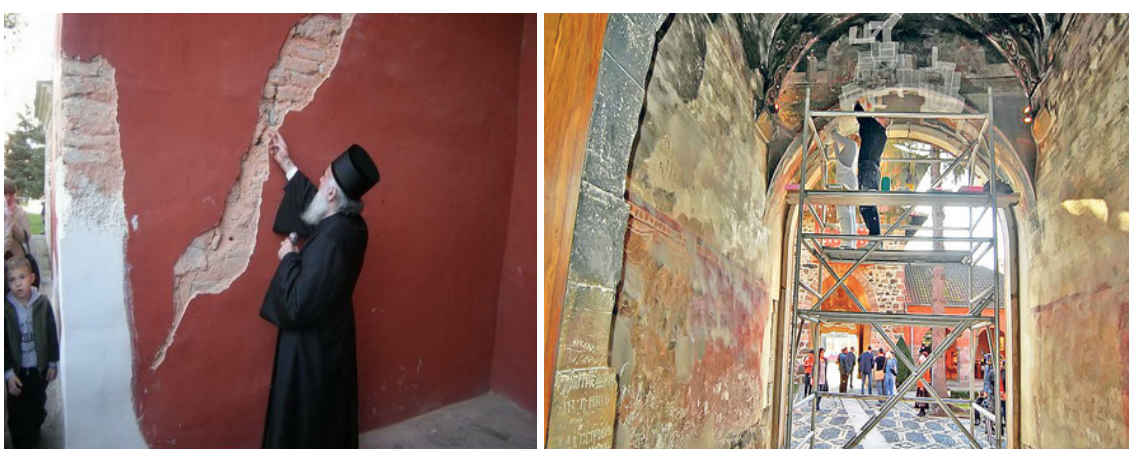


Fig. 13 October 2010 earthquake in Kraljevo: Minor damages at exterior walls of the church within Žiča Monastery, but the portico shows dramatic detaching of 14 century frescoes from the walls.

damages in other unbridled, but risky situations caused by acts of people [9]. The terrorist attacks hold the first place per frequency and extent then toxic industrial accidents, vandalism, which also includes ideological struggles, and wars wherein new inventions in war techniques are introduced. In spite of the fact that the damages may be really very similar, the strategy of protective action is not the same. When natural disasters arise, it is possible to define preventive measures far ahead of their effects and they may be standardized to great extent due to the instruments for long-lasting surveillance and forecasting of natural disasters.

### 5. Process of Planning the Actions in Emergency Situations

Implementation responsibility of this Plan is undertaken by series of administrations, from local to

the State ones, providing technical assistance, as well as the means and support in human resources. The Plan and process of planning is the task of government experts who bring together a series of data based on which they establish the Strategy and mode of its implementation. The nature and scope of either Plan depends, to great extent, on the nature of hazard and on the experience of specialists to respond to it. In regions where particular natural disasters occur more frequently, it is logical that such specialists have more experience in planning the protection measures, thus it is advisable to call for these specialists to render assistance and participate in creating Management Plans for Emergency Situations occurring in other regions. Such practice exists in our country only when affected by earthquakes, and specialists are most frequently called when an earthquake has already

devastated the cultural heritage.

In the event of natural and man-made disaster actions the Protection Plan serves as the model for local and regional administrations to prepare the guides and manuals for their own activities in the event of any natural and man action element impact. Sharing responsibilities is determined at the level of local administration, and special rescue services are provided for, e.g. firemen, labour to clear the ruins, securing infrastructure support, protection of damaged edifices by police for preventing any additional devastation of materials, which is, unfortunately, known in practice. Mobilization of specialists takes place immediately, even prior to a disaster, if such kind of natural and man-made disaster may be announced, such as, hurricanes, floods, gradual landslides, terrorism, vandalism and alike.

At all authority levels, i.e. from local to governmental ones, the planning of protection in emergency situations caused by natural and man-made disasters consists of three interconnected procedures, in general—risk assessment, planning to alleviate the consequences, and planning activities to restore the cultural heritage [10].

In order to prevent hazard in adequate manner, the community should be firstly well familiarized with the nature of hazard that might be faced. Risk assessment is a well thought-out process of understanding the occasion when any property may be damaged or affected, followed by understanding the consequences, and further on the selection and implementation of actions which may minimize the risk. Per rule, the most favourable measures are selected for the purpose of rendering the most satisfactory results in minimizing the damage as much as possible.

The resources are also identified by risk assessment, being the most important for rescue operations, apart from people. There is a lack of entire overview of cultural heritage in a number of countries, or respective data have not been electronically processed yet, thus cannot be easily integrated and plotted into the Action Plan applied in emergency situations.

The Plans, which consider the alleviation of hazards, are partially reliable. Therefore, the next step in planning future actions is how to act and respond to disaster, and which procedure should be applied for rendering the assistance to the efforts for the cultural heritage to be rehabilitated from exposure to hazard consequences in as short period of time as possible.

Numerous means and manuals have been developed for the purpose of indicating how preventive activities should be undertaken in the sense of protecting historical places, public buildings, museums, collections and libraries. These are most frequently the means prepared by public or private services when natural or man-made disasters may be foreseen, or a society is sufficiently aware and rich to be prepared for all kinds of situations in advance. There are a number of independent institutions and agencies worldwide, which are engaged in expanding the awareness of people and preparing general-purpose guides on how to behave in various emergency situations.

In spite of the fact that rapid work takes place on the development and mastering Action Plans for emergency situations, majority of countries lack well established strategy of planning that may include the procedures to be undertaken during great-scale disasters that affect a number of places, areas and spacious geographic regions. Such Plan is vitally needed to Serbia.

One typical governmental Plan of Actions in emergency situations contains numerous components that are significant for protection of cultural heritage:

- List of places and areas, which the equipment and specialists should be provided for;
- Mode of disposing destroyed materials, flooded deposits, and alike, and selection of corresponding dump;
- Plan to secure mobile property and collections;
- Rescue Plan;
- Operative Centre for control of actions in the event of emergency situation supported by the list of specialists;

- Criteria, and tolerated process of removal or safe-guarding of the ruins;
- Committee or corresponding authority to issue the licenses for particular works;
- Designing temporary protections or residential accommodations (in case of any residential building affected);
- Priority Plan of restoration activities after disaster ended.

The Plan may also contain the instructions regarding the cultural heritage when in private possession or belonging to the public, the instructions for claims and securing financial means, and others [11]. The greatest challenge in integrating the protection of cultural heritage is to overcome the gap between the conservationists and rescue teams salvaging per priority the people and property. Recently many organizations involved in the sphere of culture have become very active in securing the undisturbed bond between the conservationists and other professionals with the rescue teams that act in emergency situations.

National human resources of specialists available with the government and the means that may be utilized should be fully known to Coordination Body, which is in charge of entire Management Plan of actions in emergency situations. Since majority of the countries lack practically the Standing authority supported by the teams of specialists, which would be at the disposal of governmental and local administrations only in the events of natural disasters, it is of utmost importance to establish respective network supported by the data base on all conservationists, architects, engineers, civil engineering inspectors and other experts and consultants trained for such situations so that they may be immediately mobilized.

## **6. Conclusion: Integration of Protection and Restoration of Cultural Heritage in the Process of Actions during Emergency Situations**

Based on the needs herein above indicated as well as

similar plans existing in other countries, it is possible to propose the Management Plan for protecting cultural property during actions undertaken in emergency situations, which are conditioned by natural and man-made activity disasters [3]. The Plan is of universal character and it is flexible in relation to the values of protected cultural heritage. It is founded on strategic works, which cover preventive measures as well as measures of direct rapid interventions undertaken in course of and directly afterward natural or man-made activity disasters. A major number of preventive measures in Serbia suffer from the lack of methodology and coordination. For example, all through the works, which refer to fitting infrastructure into historical edifices some installation routes are changed in situ, and such corrections unmarked in the plans of as-built designs of infrastructure. Therefore, time is required during emergency situations to activate water installations, or cut electrical and sewerage lines. As a consequence of such acts, the catastrophic damage becomes even worse. Another example refers to insufficient maintenance or its entire lack. As a result of respective strategy that should be implemented on time, including the well devised Action Plan (Table 1), the damage caused by natural or man-made activity disasters at valuable built heritage would be alleviated by all means.

The strategic plan for protection of built heritage in emergency situations may become the powerful catalyst for the process of revitalization by which the social tissue of community is maintained and restored, creating the symbol of resistance by which it endures each and every natural element and evil men behaviour. Through application of these action plans the social network boosts simultaneously the awareness on cultural heritage importance, thus the research works show that mobilization of society and individuals in rescuing the cultural heritage from natural and man-made activity disasters is far greater than the concern for the very heritage in normal conditions.

**Table 1 Proposal for instructions for implementation of Action Plan (after different guidelines in European countries).**

	Actions	Competent and responsible authorities and bodies	Scope of the public
Short-term	<ul style="list-style-type: none"> <li>• Planning of actions during emergency situations: Model of the form with entire documentation on cultural heritage, including the column for inspection data on the edifice immediately after natural or man-made disaster, in electronic form.</li> <li>• Guide for inspection of the edifice, in electronic form.</li> </ul>	<ul style="list-style-type: none"> <li>• Central State Institution for Protection of Cultural Heritage (e.g. Department for Protection of Cultural Monuments of the Republic of Serbia; Central Institute for Conservation—Governmental Bodies)</li> </ul>	<ul style="list-style-type: none"> <li>• Entire community of the country affected by natural or man-made activity disaster</li> </ul>
Medium-term	<ul style="list-style-type: none"> <li>• Model of the Bulletin for information, containing 500-700 words</li> <li>• Planning of actions during emergency situations: Model of the Form with entire documentation on cultural heritage, including the column for inspection data on the edifice immediately after natural or man-made disaster, in printed form.</li> <li>• Training Course for conservationists to act in emergency situations</li> <li>• Model of the Form for damage evaluation reviewed anonymously</li> <li>• Anonymously reviewed Model of the policy and procedure of the Commission for actions all through and directly after the impacts of natural or man-made disaster</li> <li>• Sample of Report on damages and inspection procedures</li> <li>• Revised needs covering the cultural property, made by a separate body established as the rendering assistance-body to regular Institutions of Protection</li> <li>• Action Plan for persons in charge of planning and for conservationists</li> <li>• Video presentation of the Plan</li> </ul>	<ul style="list-style-type: none"> <li>• Ministry of Culture and Media;</li> <li>• Serbian Chamber of Engineers;</li> <li>• Serbian Society of conservationists</li> <li>• Serbian Association of Architects; Association of Managers from the Departments for Protection of Cultural Monuments;</li> <li>• Institute for Protection of Cultural Monuments (regional and local);</li> <li>• Institute for Protection of Cultural Monuments of the Republic of Serbia;</li> <li>• Central Institute for Conservation;</li> </ul> <p>In view of given items it is understood that there will be cooperation with other segments of governmental and local administration. Participation of non-governmental organizations is also possible and welcome.</p>	<ul style="list-style-type: none"> <li>• Protection Service, Commission for rendering the actions during emergency situations;</li> <li>• Competent employees of governmental and local administration</li> <li>• International Institutions, Organizations, Commissions in charge of cultural heritage (e.g. UNESCO, ICOMOS, ICCROM, Europa Nostra, etc.)</li> </ul>
Long-term	<ul style="list-style-type: none"> <li>• Overall inventory of entire cultural heritage;</li> <li>• Training;</li> <li>• Model of cost-benefit Form</li> </ul>	<ul style="list-style-type: none"> <li>• Ministry of Culture and Media;</li> <li>• Institutes for Protection of Cultural Monuments;</li> <li>• Central Institute for Conservation</li> </ul>	<ul style="list-style-type: none"> <li>• Specialists in protection of cultural immovable assets (transdisciplinary multidisciplinary, cross-disciplinary, interdisciplinary)</li> </ul>

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