

RESCUE OPERATIONS AFTER AN EARTHQUAKE

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Carrying out rescue operations after an earthquake is a complicated and demanding task. Because rescue must be accomplished quickly, all countries in which destructive earthquakes are likely to occur must have advance preparations for rescue operations. All elements, organizations, and public services that can help in any possible way, must be prepared to do so. They must know which tasks to perform and in what ways to perform them, and they must also have the necessary assets, supplies, and equipment needed for performing the anticipated rescuing tasks.

Rescue operations after an earthquake in Yugoslavia are the responsibility of the organization called "civilna zaštita"--civil defense; this organization also undertakes rescue efforts in the case of all other natural disasters and destruction caused by war. The operations are, as a rule, directed from civil defense headquarters. These headquarters also conduct the rescuing tasks after an earthquake in which they direct the operations of all the organizations, bodies, and services involved the process.

The civil defense headquarters are operative professional bodies consisting of professionals for all the tasks that civil defense must perform in all emergencies. Each particular headquarter has a commander in chief, commanding officer, and members of the headquarter--all professionals, qualified for the specific activities of civil defense. Thus each such headquarter has a professional for first aid and treatment of the injured, a professional for extinguishing fire, a professional for rescuing people from the ruins of buildings, a professional for veterinary first aid, a professional for building shelters, for radiological-biological-chemical protection, and others.

Civil protection headquarters are organized within the working organizations, communes, local communities as the smallest socio-political communities, in towns with a number of communes, and in the republic.

Each headquarter directs the rescue operations after an earthquake within its territory. In order for the work to proceed smoothly and effectively, all the headquarters have detailed plans for rescue actions after an earthquake. These plans specify all the rescuing tasks to be

performed and indicate the individuals responsible for performing them. Accordingly, these plans provide specific instructions for rescuing from ruins, taking care of the injured, taking care of the population left without homes, and all the other tasks to be performed by civil defense.

The headquarters are responsible for the performance of their tasks to the assemblies of their socio-political communities or to their self-managing bodies and their executive bodies. In turn, assemblies of socio-political communities, communes, towns, and republics and their executive bodies and self-managing bodies offer assistance to the headquarters in every possible way, so that they can effectively direct the rescuing activities. In that way the headquarters are given all possible assistance by the highest representative and self-managing bodies in their communities. These self-managing bodies bear the full responsibility to society for efficient action.

Cooperating in the rescue activities are all the inhabitants of the earthquake stricken territory that remain uninjured, units of civil defense, fire brigades, the Red Cross, working organizations in construction, health services, veterinary medicine, and public utilities. Aid to afflicted regions is a form of socialist solidarity with people who have been stricken by a great disaster, and it is also a responsibility which has been imposed by law. Cooperating also in rescue operations are units of the Yugoslav People's Army.

First aid after an earthquake has to be given to people who have been injured or wounded, buried beneath ruins, or left without homes or the basic necessities for living. This is why rescuing people buried under ruins, first aid and medical care of the injured, and temporary accommodation and material maintenance of the afflicted population are the primary rescuing tasks. The performance of other tasks has to be coordinated accordingly, in order that the most rapid, most effective rescue effort possible can be achieved.

Rescuing from the Ruins

People who are not deeply buried under ruins and are within easy access can be rescued by neighbors or other nearby inhabitants not injured in the earthquake. These people can also give first aid, if necessary. Experience has shown that up to 70 percent of those buried under ruins have been rescued in this way.

It is clear that people must therefore be properly trained and qualified. It is also very important that they know how to act in the case of an earthquake and after it, so that they will not themselves become victims and that they will be able to help inhabitants who have been afflicted as effectively and as quickly as possible. People who have been informed in these matters are less liable to panic, and their actions will be more deliberate and effective than would otherwise be the case. In Yugoslavia elementary and secondary school students are instructed how to act in cases of natural disasters and wars. Similar

instruction is organized for the adult population and is compulsory for the population in general.

People buried deep under ruins to whom access is difficult are rescued by technical civil defense units. This is performed primarily by rescue specialists. Units must be adequately qualified and equipped. They are directed by building technicians and engineers very familiar with the construction of buildings, types of ruins, building materials, and hazardousness of ruins. In this manner they can in each particular case choose the most suitable way of access to those buried under the ruins and the best way of rescuing them. Construction organizations help in cases where people buried under ruins are still alive and only when their techniques do not threaten to cause further destruction of buildings, and they help to remove ruins from streets and other communication lines.

The injured are given first aid while they are being rescued. If possible, this is done on the spot, if not, later, after the injured have been rescued.

Although rescue from deep under ruins is most often very complicated and calls for appropriate caution, it must all the same be performed very quickly. People beneath ruins do not hold out long, especially if they are injured or crushed under the ruins. Most uninjured people hold out for two days, a few people can endure up to four days, and only extremely psychologically and physically strong individuals can hold out longer.

Because rescue must be accomplished as quickly as possible, it is necessary to start with demolished buildings under which it is certain people are buried. Of course it is necessary to find out approximately where these people are. Detecting this can be done in different ways:

by inquiring among inhabitants of neighboring buildings who know the circumstances in the demolished buildings;

by calling to people beneath the ruins. This calling is done by frequent consecutive beating at regular intervals on conduits or other parts of buildings which easily transmit sound (water pipes and conductors of heat or concrete structural elements). After each beating we must listen for any response by pressing our ears against the same part of the building;

by listening with the help of geophones (devices which enable us to perceive very weak sounds coming from the ruins). Geophones are part of the equipment which civil defense technical rescue units always carry with them;

by searching for people beneath the ruins with the help of dogs specially trained for this purpose. The organization concerned with training dogs in the republic of Slovenia is the Mountain Rescuing Organization which trains dogs to be used to rescue people from under snow avalanches. These dogs are also trained to search for people who have been buried beneath ruins.

Treatment of the Injured

The number of injured in the case of severe earthquakes is very high. For that reason the health services in the afflicted territory--though widely spread--cannot take care of them all in the quickest way possible. First aid, which must be given on the spot where the wounded and injured are, is thus given by nearby uninjured inhabitants and by first aid units, civil defense units, and Red Cross units.

The inhabitants usually are not sufficiently qualified to give first aid in cases of severe injuries or wounds and can only offer first aid to the less severely injured and wounded people. For bandaging of wounds the material that is kept in houses or cars is used. According to regulations each car must have an ample quantity of different bandaging materials in a place well in sight.

The more severely wounded and injured people are treated by the units mentioned above. First aid civil defense units and other civil defense units are organized in all communities where people live and work, hence, in all places, all working organizations and collectives, and in each commune, where larger specialized units operate. The Red Cross has more specialized first aid units only in communes with larger centers. In other communes there are only Red Cross parties. Each first aid party, whether a civil defense or a Red Cross party, is fully equipped with all necessary material, stretchers for the injured and blankets.

As soon as a wounded individual has been treated by the party, he is taken to an ambulance dispensary or medical station, if it is nearby, otherwise special stations for general medical aid are formed. These stations are formed by medical organizations from the afflicted and non-afflicted regions. Each station has a physician and a medical assistant and other personnel. The station can operate in tents or, in case of good weather, outdoors. The medical organizations have all the necessary equipment for forming such stations. One station for general medical aid is formed for each ten first aid parties. If the station is too far to take the wounded, they are brought together first and then taken to the station by a motor vehicle.

At the station a physician treats the injured, if necessary, and at the same time classifies them according to the degree of the injury into three groups: the most severely wounded in urgent need of surgical aid, those who must be sent to a hospital, and the less severely wounded and injured who are sent into family treatment.

The severely wounded, requiring urgent surgical aid, are sent from the station for general medical aid or from the medical ambulance dispensary to the surgical station. The surgical stations are, like the stations for general medical aid, temporary medical institutions operating only for as long as the circumstances require. They are formed by hospitals which also have all the necessary equipment for them. For each three stations for general medical aid one surgical station is organized. Surgical stations should best be located under big tents. Here they are safe either in case of bad weather or in case of another

earthquake. After the injured have been given emergency surgical aid, they are sent to a hospital.

Where earthquakes have demolished many structures, they have also demolished hospitals. Numerous aftershocks following the first demolishing earthquake further handicap working in damaged hospitals. The shocks disturb the injured and impede the work of the medical personnel. For this reason, survivors have to be evacuated to hospitals outside the afflicted area. If these are already full, new temporary hospitals have to be set up. Temporary hospitals can work under tents, weather permitting, otherwise they must be placed in adequate tourist facilities outside the afflicted territory. For transportation of the injured, ambulances, cars, and other vehicles such as vans, trucks, buses, and helicopters are used.

Providing for the Afflicted Inhabitants

After a devastating earthquake many inhabitants are left without homes, because their houses have either been demolished or so badly damaged that living in them is no longer safe. Inhabitants who have lost their homes have also lost all the other basic necessities for living: clothing and footwear, bedding, food, means for preparing food, etc.

The inhabitants themselves cannot judge which damaged buildings are not suitable for habitation because they are all potentially unsafe. To avoid further victims from subsequent shocks, parties of building professionals must examine as quickly as possible all damaged buildings and determine which buildings must be vacated.

As quickly as possible new temporary dwellings must be arranged for all the inhabitants without homes. Experience has shown that it is best to locate temporary dwelling places for afflicted inhabitants in the vicinity of their former houses. If this done, the inhabitants can help with reconstruction of the settlements, they can work in the fields, or continue their professional work, whatever it is, as soon as circumstances allow. This kind of solution is at the same time cheaper than, for instance, moving inhabitants to tourist resorts and placing them in hotels and motels.

To arrange temporary habitation facilities, tents, vans, caravans, trailers, railway coaches, buses, and the like are used.

Tents are the quickest to put up, but they are not suitable in winter and they also give poor shelter against rain and wind. Therefore, they must be replaced as quickly as possible. Large tents can be used for common purposes such as storing goods, kitchens, classrooms, and the like. In past earthquakes tents were used as accommodations for inhabitants only for a short time. They were usually sent to the afflicted area by camping organizations, trade union organizations, and the Yugoslav People's Army units.

Building sheds should be considered only when other solutions are not possible or adequate; it takes a lot of time and is also rather expensive.

In earthquakes that occurred in the the last ten years, afflicted inhabitants were temporarily accommodated in caravans or trailers. The majority of these had been lent by trade union organizations, but a number of them had been sent as a form of aid to the afflicted territories by other republics, and a certain number was bought by the afflicted republic.

Special attention must be given to areas where water supply systems have been damaged. Damaged water pipes must be repaired as quickly as possible. Until that is done, water must be brought in tanks.

Supply of food to the afflicted territory likewise requires adequate attention. Food must be brought as quickly as possible. Food can be temporarily prepared in field kitchens even when this solution is appropriate only for a short period of time. Field kitchens are set up by the Yugoslav People's Army units, civil defense units, and Red Cross units. In the meantime, arrangement of special necessary kitchens and dining facilities can be carried out. However, major attention should be directed at the same time to creating conditions in which families can prepare their own food, such as is possible, for instance, if they live in caravans.

Red Cross organizations are very important for providing inhabitants with clothing and bedding. Every year the Red Cross organizes regular collections. These actions are very succesful and, after careful survey and sorting, the collected clothing and bedding is sent to storehouses that the Red Cross maintains in numerous communes. The material collected in this way covers the most urgent needs which arise in the case of an earthquake, and serves until aid from the other republics and from the international Red Cross organization arrives. Whatever is still lacking is bought by the Red Cross or the sociopolitical community. Clothing and bedding is distributed according to need by civil defense parties for social aid with cooperation of the Red Cross and communal bodies for social security. Quickly supplying adequate warm clothing and bedding is urgent especially in case of bad weather.

Special attention must be paid to children and elderly people left without relatives. The task of the social service is to see to it that they get homes as soon as possible, either with their families, families who are willing to take them in, or in homes for elderly people. For children whose families have suffered most severely, the Red Cross organizes temporary dwellings with their families or in other convenient places, and also sees that their living together is made interesting by a variety of pleasant and useful activities.

In temporary dwellings it is very important to ensure that as soon as possible people become engaged in a variety of activities so that they can forget about the psychological stress suffered in the earthquake.

It is very important that certain necessary hygienic-epidemiologic measures are undertaken in the afflicted territory, and especially in the temporary dwellings. These must be organized so that the maintenance of personal and other hygiene is possible. Water sources must be controlled immediately after the earthquake, and they must be checked again later, especially after stronger repeated shocks. Chlorine must be added to the water to disinfect it.

The inhabitants must be vaccinated, especially in the warm seasons, against infectious diseases that are liable to erupt in the afflicted territory. It is also very important that vermin, rats, and mice be destroyed, especially in temporary settlements. All these tasks are to be performed by the medical service, assisted by the previously mentioned civil defense units for social work, and if necessary first aid units.

Other Urgent Tasks

In order to accomplish all these tasks, rescuing people from ruins, transporting the injured, and other tasks as quickly as possible, debris, fallen rock, and land slides must be removed from the roads. The parts of roads which have been demolished must be repaired and/or other roads constructed. These tasks are performed by road-construction and public utilities services together with construction organizations and units of the Yugoslav People's Army trained in the techniques needed for this kind of work.

In order to make living bearable in temporary dwellings and buildings which have survived, it is necessary to repair all installations that have been damaged: water pipes, sewers, electricity supply, gas pipes. These tasks are performed by competent communal organizations. In the case of a severe earthquake this work may be rather extensive, and similar professional organizations from other territories may have to send workers and technical aid, and, if necessary, also civil defense units.

Livestock in the afflicted territory must receive special attention. Wounded and injured cattle must be given first aid, while those animals for which treatment would take too long or probably not be successful must be slaughtered. First aid is given by cattle raisers and veterinary services. If necessary, veterinary professionals from other areas are called in. Where there are no slaughter houses, field slaughter houses for killing severely injured animals are organized. They are organized by civil defense units and supervised by professionals from veterinary services.

A severe earthquake destroys numerous stalls, many are damaged to the extent where they cannot be used until repaired. It is then necessary to make temporary stables using wood planks open or covered, depending on weather conditions and the time of year. This work is done by cattle raisers and, if necessary, by other workers and professionals. The material needed is supplied by wood processing industries.

The situation after an earthquake when access to damaged flats, stores, warehouses, banks, and other facilities is possible, provides temptation for all sorts of criminals. Necessary measures for safeguarding order and security must be taken and continued as long as required. Police are in charge of order and security, if necessary they are helped by teams from other regions.

Identification and burial of the dead must also be done as quickly as possible. The dead are identified by rescuing teams as soon as they are brought from beneath the ruins, either by the help of relatives or neighbors or by means of documents that have been found with the corpses. If this is not possible, identification is made by special identifying units. Such units, including experienced professionals, are organized at all medical faculties. Identifying teams are also formed within civil defense units in the communes. Thus a number of teams can be operating simultaneously in the afflicted territory. In case of severe earthquakes where there is a great number of fatalities, it is frequently not possible to perform identification in cases that call for longer identifying procedures. A number of dead may remain unidentified.

It is necessary to try to bury the dead in the place and in the way that relatives find desirable. Burial is done by appropriate communal organizations assisted by additional personnel. If the number of the dead is high, it may be necessary to use collective graves. Special machines are used to dig such graves quickly.

Inquiries about the victims and collecting of data about them are handled by communal and republican Red Cross organizations that form special teams for the purpose. These organizations give information about victims to relatives directly or through international Red Cross organizations.

Some of the rescue work must proceed continuously, day and night. This is especially important while rescuing people from ruins, giving first aid and medical treatment, arranging temporary dwellings, giving first aid to cattle, repairing communication lines, clearing streets and roads of debris, and operating civil defense headquarters. It is important to have electric light where the work is in process and in medical institutions and centers. Since the electricity supply has probably been damaged, other solutions must be found. Most medical institutions and a number of civil defense headquarters have motor generators to produce electric power and supply others. Many other working organizations also have them. Gas lamps are also quite suitable for illumination. If all that does not suffice, improvisations are necessary. Emergency conduits from power batteries to where light is needed can be installed. Ruins and other working areas can be flood-lighted temporarily by car headlights.

Motor vehicles, machines, and generators are used in rescue operations. They need a lot of oil and petrol which must be delivered in sufficient quantities. This is the task of an appointed organization regularly responsible for this section of supplies.