



FUERWAG LANDSLIDE DISASTER MANAGEMENT MONITORING & WARNING – SYSTEM

FÜR WAG RUTSCHUNG KATASTROPHENMANAGEMENT MONITORING & WARNSYSTEM

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ABSTRACT

To observe the large mass movement FUERWAG – LANDSIDE in the north of the Union State Capital SALZBURG/AUSTRIA a Monitoring and Warning System was established. Besides the installation are also used for investigation and research on the causes of the landslide. The observations are the base for the decisions of the responsible staff of the Official Security Management by the local District Government.

The Monitoring System includes extensometers, movement warners, borehole survey and high quality survey. The Monitoring System was based on a geo-technical mapping and an exact surveying of the concerned sliding area and their immediate surroundings. A Task-Force of specialists and expert decides every week on the results of the monitoring and informs the authority and supports their decision.

ZUSAMMENFASSUNG

Zur Beobachtung der ausgedehnten großen Massenbewegungen RUTSCHUNG FUERWAG im Norden der Stadt Salzburg/Österreich wurde ein Monitoring- und Warnsystem eingerichtet. Gleichzeitig wird dieses System auch für die Erforschung der Rutschungsursachen verwendet. Die Werte des Monitorings dienen auch als Entscheidungsgrundlage für die Verantwortlichen des Sicherheitsstabes der Bezirkshauptmannschaft.

Das Monitoring System besteht aus Extensometern, Bewegungswarnern, Bohrungen und Feinvermessung. Das Beobachtungssystem stützt sich auf eine geotechnische Kartierung und eine detaillierte Geländeaufnahme der Rutschflächen und ihrer Umgebung. Ein Fachstab aus Spezialisten und Experten beurteilen wöchentlich die gemessenen Werte und informieren die Entscheidungsträger und unterstützen deren Entscheidungen.

KEYWORDS: Landslide Fuerwag/Salzburg, disaster management, monitoring system, warning system.

INTRODUCTION

The South-Western slope of the HAUNSBURG¹⁾, which has an altitude of some 835 metres, consists of a geological sliding mass, creeping downhill in two branches and meeting in the area of „FUERWAG“ in an accumulation sliding mass which is close to 3 kilometres wide. Since decades this area has had earth movements in various parts.

Due to already damaged forests and files, property owners on the one hand are affected and endangered by these slide movements, mains and public traffic network on the other.

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In this specific case a high-voltage power line and an earth-gas pipeline of a regional energy supplier, the main road to the northern district of Flachgau, the rural road running parallel to this road, the local railway line as well as the optic fibre-glass cables of the telecommunication company „Telecom Austria AG“ are affected.

All mentioned mains and traffic ways run along the lower part of the sliding mass. Based on the geographical situation in this area they are the most significant possible supplier of the northern District Salzburg and Surroundings with electricity, earth-gas, telecommunication and continuations of public- and individual traffic.

The legal base and status for the installation of the monitoring occurrence whose results endanger humans of material things at a large scale. Emergency police takes all measures which repulse and control as well as prevent disasters.

Measures against disaster repulsion and control can only be executed once and endangering or occurring event has been declared state of emergency of the area by the District Administration Authorities.

DISASTER MANAGEMENT

In the district Salzburg the disaster management is carried out by the head of operations. Head of operations is the Head of the District Authority or his/her deputy.

The structure of the disaster management had to fulfil the following basic requirements:

1. Additional exploration of the danger potential, investigation of the causes, drawing up concepts of solutions and constant control of further landslides by the task-force.
2. Drawing up of special alarm plans.
3. Permanent information to all concerned and to the public.
4. Continuous reports to the head of operations.
5. Co-operation of those involved during the realisation of measures.

TASK-FORCE – GROUP OF SPECIALISTS AND EXPERTS

Every Monday at 14.00 hours a weekly meeting was held at the offices of the District Administration of Salzburg and Surroundings. Obligatory present were the head of operations, the national geologist, representatives of the Federal Service in Torrent, Avalanche and Erosion Control, hydraulic- and forestry technical engineers, members of the office commissioned with the geological mapping and additional experts and representatives of the Authorities were called in when needed.

The results of additional facts and inquires, surveying results, conclusions reached in respect of the causing factors, as well as the outcome of executed immediate measures were discussed in those weekly meetings.

Based on these gatherings further official immediate measures were ordered. Those weekly meetings assured that all concerned and involved were regularly informed. Also, the execution and efficiency of the instructed immediate measures were supervised and controlled and the foundation for further immediate measures was rendered.

Information of those Concerned

People concerned were continuously informed of the results of the experts commission as well as official orders based on their findings by handing over of the minutes of these meetings.

Furthermore, about once a month large-scale meetings with all the concerned took place enabling them to gather further information directly.

Official Internal Task-Force

The exchange of information took place on Authority levels by means of continuous co-ordination talks with all other Agencies involved as well as the Head of District Authority.

Co-ordination of Actions by the Head of Operations

During all ordered immediate measures a constant and reliable co-operation with all institutions involved in this disaster was guaranteed.

According to the verified requests of the experts' group, they for instance performed continuous surveys and reported the findings promptly to the official task-team.

This alternating exchange of information was co-ordinated and organised by the head of operations.

It was proven that there, as well as during the setting-up of the needed alarm- and action plans, how tremendously important a close collaboration between those concerned and the Authorities is.

ALARM PLAN

Ordered by the Authorities, special alarm plans have been developed or existing former special alarm plans have been revised and adapted in order to meet all specific demands to avoid another landslide.

Depending on the intensity of the disaster, gradual sequences of actions have been determined. Networks of communication, alarm plans and concepts with chronological sequences have been arranged.

The common of these special alarm plans was to guarantee supplies to the northern parts of the district „Salzburg and Surroundings“ and allowing for provisions in the worst case.

The special alarm plan were freely disposable to the Agencies and concerned scenario to form a base for official actions plans in case of further landslides.

Official Special Alarm plan

One of the core issues of the official disaster management consisted in creating a special alarm plan meeting with all specific demands in such a disaster case.

A particular difficulty in creating such a special alarm plan was the clear definition, when and under which circumstance the alarm plan was to be activated.

To develop an all encompassing and comprehensive precaution plan for this region was also found to be a further problem because of the geographic situation.

The special alarm plan contains essential elements like the establishment of a head of operation and an action team, a network of alarm plans, basic directions and traffic announcements.

Local Security Management

A base of the disaster management was set up in the direct vicinity of the landslide and was equipped with all technical necessary utilities (like telephone, fax, personal computer, writing material, etc.)

The disaster management and an expert advisory board were formed. Furthermore, for the special alarm plan „landslide Fürweg“, a network of alarm plans was prepared and the imminent reach of all involved at any time was guaranteed.

Text modules for public information and traffic announcements were prepared.

Traffic Concept

Additionally to the special alarm plan, a traffic guide concept in the various stages of a disaster was prepared.

To guarantee public- and individual traffic, this traffic guide concept contained sign postings, detours, an establishment of a rail traffic replacement, cordoning off measures aided by police and preparations for a complete barricade in the worst case.

With this traffic guide concept as well as the official and the local special alarm plans it was determined well in advance what had to be ordered and done in case of an onset of a disaster.

MONITORING

By measuring rain- and snowfall and regular control of staking poles, extensometers and boreholes an early recognition of danger in view of further landslides should be ensured.

The sampling site of the hydrographic Services in „Nussdorf“ daily announced all data of precipitation.

Labourers of the Torrent, Avalanche and Erosion Control Service are daily controlling staking poles. Noticeable changes were immediately reported to the District Administration of Salzburg and Surroundings.

Also on Saturdays, Sundays and holidays controlling of precipitation data and staking poles continued.

Concluding from the geological territorial survey it was stated by the specialists and experts that drillings in the area of the main road, at the local train line and the old rural road at the foot of the slope are absolutely necessary. Investigation of this area and lasting de-watering should ensure further safety of the railway or the mains.

Based on the findings of the experts the security management ordered the start of the drillings as another immediate measures and like entitled by the disaster relief law. This should prepare a basis for a long-term well de-watering system in the lower parts of the slope.

Parallel to the drillings, surveying in the direct landslide area as well as along the main road, the local railway line and at the earth-pipeline was taken up.

Pre-Warning

Based on the knowledge at this point in time it was to be expected that a massive danger of further landslides existed when rainfall and thaw increased.

In case of an initiation of the pre-warning system, immediate examinations and safety controls were ordered by the disaster management.

The operation of the local railway and the earth-gas supply could only be maintained when the instant control mechanisms could verify the safety.

The results of these observations had to be reported to the Authorities within one hour.

Based on massive rainfall and expected thaw in the middle of February 1999, the official head of operations has announced the pre-warning system of the special alarm plan on February 20th, 1999 at 08:45 hours.

As laid down in the special alarm plan all necessary safety controls have been executed with the enormous engagement and risk by all involved.

The results of these examinations were promptly reported to the disaster management and to the group of experts to initiate necessary immediate steps.

Since the weather situation relaxed again and the executed de-watering measures of the Torrent, Avalanche and Erosion Control have started to improve the situation at this point in time, the pre-warning system could be lifted.

On March 3rd, 1999 at the final meeting of the expert groups it was learnt that the tendency of earth movement in the upper part of the slope showed clear signs of improvement.

Based on the generally improving weather situation and due to massive de-watering measures in the upper part of the slope, new landslides endangering the lower part could be prevented. It was therefore suggested to lift the state of emergency of the area.

On March 30th, 1999 the announcement by the District Administration of Salzburg and Surroundings declared the state of emergence of the area as lifted.

Linked with lifting the state of emergency of the area, further weather forecasts and snow measurements were stopped. Parking at both parking places at the main street to „Lamprechtshausen“ was also possible again.

The special alarm plan was not effected by the lift in order to be re-activated at any time.

On 30th of March, 1999 a final meeting took place at the District Administration of Salzburg and Surroundings with all specialists and experts, people concerned and involved. The financial handling and settlement of the security plans was discussed in detail.

In August 2000 a rockfall activated the southern part of the landslide. The drainage system built 1992 – 1995 was destroyed respectively heavy damaged and therefore out of function. Due to the wet and humid winter the landslide starts to move in spring 2001. The movement were up to 15 m per week in a small narrow passage but never reached the down infrastructure except the electricity lines.

Immediately the step of pre-warning was set up and is current. Since spring 2001 the Austrian Federal Service in Torrent, Avalanche and Erosion Control is implementing immediate countermeasures (open drain ditches, filter dams) and developing a master plan for definitive countermeasures after the stop of the movement.

FINANCES

An immediate emergency operation must be ordered by the head of operations and may only entail measures to avoid increasing the damage.

Furthermore, all ordered actions may not show a character of a lasting rehabilitation.

In Salzburg, according to the national disaster relief law, the Regional Government of „Land Salzburg“ has to bear the operational costs for disaster relief services.

Related guidelines for granting financial subsidies of disaster assistance provide following conditions:

Immediate emergency assistance measures are such when ordered by the District Administration within 36 hours after a disaster.

Based on the recommendation of a commission, the Regional Government decides on granting subsidy. A legal claim for subsidy grants does not exist.

In state of emergencies the chairman of the commission can individually claim an immediate advance payment of the expected subsidy grant. The approval by the Regional Government can be obtained afterwards.

Based on these guide lines and by approval of the chairman of the commission, i.e. the responsible District Governor of the Regional Government of Salzburg, a total amount of 290.000,-- € (4,0 millions Austrian Schooling) has been paid out after submission of all bills.

CONCLUSION

Due to the encompassing legal, expertise and financial co-ordination as well as the organisational handling of the landslide on the „Haunsberg“ we have gathered utmost valuable experience about security disaster management.

The most valuable personal experience for us was the following:

Only through participatory approach and consistent collaboration of all those involved in the disaster management and through uncompromising keenness as well as permanent support amongst each other within the complete team, the aimed target – the averting of a disaster – could be achieved.

Thanks to all involved in this specific disaster, another massive landslide could be avoided.

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