

COPING WITH RISK: FLOOD RISK MANAGEMENT IN SWITZERLAND

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Abstract

The new flood risk management in Switzerland means that residential, industrial and landscape areas must be protected in an appropriate way. An overall prevention should guarantee that damage caused by extreme events will not increase in future. Uncertainties in hydrometeorological and other input data should be reduced but taken into consideration when setting-up the flood protection concept. The remaining risk is to quantify. Environmental concerns must be included in the planning process as early as possible. The procedure used in Switzerland is described briefly. Emphasis is given to the role of hydrology in risk management.

Most of the basins in Switzerland are prone to floods, landslides and as well as to debris and mud flows. During the last centuries structural protection measures have substantially improved the flood prevention and have supported the economic development in Switzerland.

But the experience during recent years with extreme floods has shown that structural measures alone can not guarantee sufficient protection; new approaches are necessary.

Mayor efforts in flood prevention are required in future because of the following reasons:

- The damage potential has strongly increased in many areas due to intense land-use and increasing economic value in endangered zones.
- In the channelized rivers concentration time of runoff is influenced, resulting often in higher flood peaks.
- Missing space and retention areas to govern large scale events.
- Maintenance deficiencies of constructions and river beds.
- Changes in runoff as a result of climate change and variations.

Therefore a new flood protection policy has been developed. It will not only consider safety aspects but also all other aspects of sustainable development as well. It is based on land use planning, maintenance of the systems and structural measures. Environmental concerns and economic factors must be included in the planning process as early as possible. This comprehensive hazard assessment, the differentiation of protection measures, the adequate planning of measures and the limitation of the remaining risks is fixed in the Federal Law on Flood control of 1993.

The comprehensive analyse contains investigations of hydrometeorological situation, hydraulic conditions, damage potential, river bed and aquatic and terrestrial issues. Estimation of flood risk, observation of discharge, documentation and analyse of extreme flood event, knowledge about flood generation and concentration processes, estimation of flood peak discharges in ungauged basins as well as impacts of climate change on runoff and sediment transport are important information.

There is no risk management without a sound knowledge of the risk. Risk is depending

on the hazard and the potential damage. Since potential damage is a very dynamic parameter, depending on ever changing land use, it was decided that hazard mapping was more important than risk mapping. The risk can be evaluated by each user, when the hazard is known. Since different actors need different information on the hazard, it was decided that hazard maps are generalized indicating the type and the degree of the hazard. The types of danger distinguished in the flood risks maps are: inundation (dynamic, static), bank erosion and debris flow.

According to the damage potential different protection levels are used. Expensive infrastructures must be protected to a higher design flood than cheap ones. Based on this principle agricultural land and isolated buildings need less protection than dense residential and industrial areas. But detailed investigations are still necessary for decision making.

Maintenance of the water courses, land-use planning and structural protection measures are the alternatives of flood protection.

Even if all measures have been properly carried out there is still a "residual risk". Emergency planning and its implementation therefore becomes an integral component of every flood policy. Flood forecast, the operation of warning systems, the preparation of evacuation schemes as well as the set-up and training of rescue units are important parts of the emergency planning in Switzerland.