REDUCING ALPINE NATURAL DISASTERS

WHY ACTING IN LINE WITH THE RISK APPROACH IS NOT ENOUGH

Wagner Klaus¹, Suda Michael², Hagemeier Maria³

After every natural disaster discussions occur why the damage due to the event was so high. In this paper we do not want to look on the natural phenomenon side but on the re(action) of the policy-making system. In scientific debate, legislation, and praxis three different approaches to mitigate the effects of natural hazards or natural disasters can be observed:
1. Security approach: The state should guarantee a uniform security level for all citizens.
2. Risk approach: State funds should be allocated in an optimal way to reduce the risk level of the state or a special region.
3. Resilience approach: Resilience of society should be increased and vulnerability decreased to reduce the losses due to natural disasters.

The security approach which was implemented in the legislation of the alpine countries since the 1850s is criticized due to an ineffective money allocation because areas with high damage potential are not better protected than those with low damage potential. Natural hazard policies and practices have changed over the last years to act more in line with the risk approach. For example, in Switzerland the National Platform for Natural Hazards (PLANAT) has adopted the mission statement «from defending against danger to being aware of risks». PLANAT also recommends harmonizing the different laws (forestry, water law etc.) on the basis of the risk approach.

Technical protection measures planned and built in line with the risk approach can have negative impact, too. This can be explained with the so called “levee effect”: If a levee is built people behind the levee as well as the local officials tend to think that they are now “safe”. Thus, without binding building restrictions the area behind the levee will be developed as if it was really safe. This leads to an increased damage potential which will be realized when the levee is eventually overtopped. Burby (2006) broadens this perspective and explains that every measure which leads to such a false sense of security will lead to higher future damage. For example, Keiler (2004) and Fuchs (2004) showed that danger zone mapping in the Austrian and Swiss Alps leads to the highest growth rate of development directly at the edge of the building ban zone because people know where it is “safe” to build houses according to the danger zone plan. If climate change for example leads to a more severe hazard, the spatial planning system would have helped to increase the damage potential.

The main question is which combination of structural and non-structural measures helps to reduce risk but also inhibits the increase of damage potential to overcome the safe development paradox. Or in other words: Which measures reduce risk and vulnerability of society over a long time frame. First, all technical measures have to be checked how they react if the danger process is bigger than the design event (see table 1). Like levees which have no effect if they are breaking or overtopped those structural measures should be avoided which lead to

¹ Dr. Klaus Wagner, Scientific Assistant, Chair of Forest and Environmental Policy, Technische Universität München, Am Hochanger 13, 85354 Freising, Germany (Phone: +49/8161/714751; Fax: +49/8161/714623; email: wagner@forst.tu-muenchen.de)
² Prof. Dr. Michael Suda, Head of the Chair of Forest and Environmental Policy, Technische Universität München
³ PhD student, Chair of Forest and Environmental Policy, Technische Universität München
greater or the same damage if they fail or the design event is exceeded. For example, a flash flood at the Lainbach in 1990 destroyed all (!) torrent check dams in the upper course of the torrent and mobilized additional bed load. Second, the focus should be more on non-structural measures to increase or at least keep constant the awareness of people at risk and local representatives. Most important is the development of a compulsory insurance system. The insurance premium has to be high for people in high risk zones because otherwise people in relatively secure locations subsidise the allocation of damage potential. The American flood insurance program is unfortunately an example for such a risk transfer and its unintended outcomes (Steinberg, 2006). With high premiums insurance introduces the ‘magic hand of the market’ which will lead to less development in danger zones. Another important action, to inhibit development of areas protected by technical measures was adopted by Tyrol (Austria). The spatial planning law of Tyrol forbids development in the direction of a hazard: „Grundflächen […] dürfen nur dann als Bauland gewidmet werden, wenn […] das Bauland dadurch nicht in Bereiche mit erheblich höheren Gefährdungspotentialen erweitert wird“ (§37, Abs. 2, Tiroler Raumordnungsgesetz, 21.2.2006). Third, hazard protection has to become an important topic for the local stakeholders. Over the last 150 years the alpine states have overaken full responsibility for natural hazard protection. The resilience approach tries to bring responsibility back to the local people and combine natural hazard protection with the theme of sustainable development.

Tab. 1: Protection measures grouped according to their reaction during an event that exceeds the design event

<table>
<thead>
<tr>
<th>Measure leads to higher hazard impact</th>
<th>Torrent check dams because they often break and than mobilize additional bed load.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure leads to higher hazard impact</td>
<td>Levees, drainage of land slide areas, consolidation dams at the toe of a landslide</td>
</tr>
<tr>
<td>Measure leads to higher hazard impact</td>
<td>Debris retention constructions which are filled but do not break in a debris flow, bigger and deeper river beds, snow retention constructions</td>
</tr>
</tbody>
</table>

This paper cannot provide a complete answer to the addressed question; rather, we would propose a research agenda with the following three topics:
1. Systematic analysis of failures of structural measures especially for big events (failure frequency; impact of the failure etc.).
2. Analysis of new integrated protection concepts regarding not only their technical feasibility but also their impact on public risk perception.
3. Development of bottom-up approaches which combine natural hazard protection with sustainable development.

LITERATURE

Keywords: security approach, risk approach, vulnerability approach, safe development paradox