Programme for Flood-Safe Development in Settlement Area

Wasser Wirtschaft Land Steiermark

A16

CONTENTS

1 REGULATION

Regulation Adopted by the Styrian Government on..... on a Programme for the Flood-Safe Development of Settlement Areas

In accordance with § 8 of the Styrian Spatial Planning Act 1974, LGBl.No. (Styrian Law Gazette No.) 127/1974, as last amended by LGBl.No.(Styrian Law Gazette No.) 13/2005, the following is decreed:

§ 1

General Provisions

(1) The purpose of this Development Programme is to minimise the risk in case of flood events or events occurring in torrent and avalanche catchment areas by taking appropriate spatial planning measures.

(2) The Development Programme consists of this text and a layout plan (Annex). The Annex is published and open for general inspection and during official working hours at:

- the competent agencies of the *Amt der Steiermärkischen Landesregierung* (Styrian Government Office) having the responsibility for the technical and legal issues of spatial planning;
- the respective *Bezirkshauptmannschaften* (District Administration Offices).

§ 2

Definitions

(1) "Floods with a one-hundred-year return period (HQ 100)" refer to an event which is likely to occur or to be exceeded, on average, once within a period of 100 years as predicted by the *Bundeswasserbauverwaltung* (Federal Water Engineering Administration) on the basis of discharge analyses conducted over an infinite, hypothetical series of years of observation.

(2) "Priority zones for settlement development". Priority zones for industry and commerce and development sites for industry and commerce are identified in the Regional Development Plans as set out under § 10 of the Styrian Spatial Planning Act 1974.

(3) "Red hazard zones", as defined by the Regulation of the Federal Minister of Agriculture and Forestry on hazard zone maps of 30 July 1976, are those areas which are so severely endangered by torrents or avalanches that their permanent use for settlement and transport purposes is not possible at all or would require disproportionally high investments, given the expected impact or frequency of the design event." Yellow hazard zones" refer to all other areas which are endangered by torrents or avalanches and whose permanent use for settlement and transport purposes is restricted by these hazards.

(4) "Blue restricted zones" as defined by the Regulation of the Federal Minister of Agriculture and Forestry on hazard zone maps of 30 July 1976 designate areas which are needed by the responsible agencies to carry out technical or forest-biological measures as well as activities required to ensure the sustained effectiveness of these measures, or which call for a special type of management to safeguard a protective function or the success of a defence structure.

§ 3

Principles and Priorities

(1) To minimise the risk associated with flood events as defined by the spatial planning principles under § 3(1) and the objective to be pursued as set out under § 3(2)(2) of the Styrian Spatial Planning Act, the spatial conditions for water retention in the flood catchment and discharge areas shall be preserved or improved. To this end uninterrupted open spaces shall be maintained in these areas to keep the hazard and risk potential as low as possible in case of flood events. In addition to their passive flood protection function, these spaces fulfil other important functions as open areas used for agriculture and recreation as well as for biotope conservation and by providing habitats for species.

(2) Maintaining, as a matter of precaution, flood retention and discharge areas as well as hazard zones as identified by the *Forsttechnischer Dienst der Wildbach und Lawinenverbauung* (Forest Engineering Service for Torrent and Avalanche Control) as open spaces shall have priority over subsequent remedial action.

§ 4

Measures

(1) The following areas shall be barred, pursuant to § 23(1) and (3), from being used as building land and, pursuant to § 25(2) of the Styrian Spatial Planning Act, from any use of open space which may increase the hazard potential and obstruct discharge (e.g. landfill areas) as well as from any new construction pursuant to § 25(3)(1)(b) of the Styrian Spatial Planning Act:

1. flood discharge areas for floods with a 100-year recurrence interval (HQ 100);
2. Red hazard zones as identified in the hazard zone maps according to the provisions of the Forestry Law;
3. areas which are especially suited for flood protection measures, and Blue restricted areas as identified in the hazard zone maps according to the provisions of the Forestry Law; and
4. riparian strips along naturally flowing water courses of at least 10 m in width as measured from the top edge of the embankment (in some cases, if required to fulfil its function, also wider).

(2) Deviating from paragraph 1(1), permission shall be given in HQ 100 discharge areas for additions to existing buildings pursuant to § 25(3)(1)(b) as well as for designations as specified is the following table:

Designations Permissible in Areas Designated as HQ 100 Discharge Areas

Conditions in terms of spatial planning							Conditions in terms of water management
Reasons for exemption	**Type of exemption**		**Conditions in terms of site**	**Definition**	**Upper limit**	**Categories of building land**	
Insignificance	consolidation			enclosure of building land on 3 or 4 sides	max. 3000m^2 per consolidation	all	• Flood protection including freeboard against a HQ 100 event is technically feasible at economically viable costs. • A significant deterioration in the discharge situation is not to be expected. • These areas are not particularly endangered by high flow velocities or water depths such as discharge troughs.
public interest	expansion – in the absence of any other option for expansion		in priority zones for settlement development and at development sites for industry and commerce as defined in the Regional Development Programme areas for the expansion of existing enterprises	adjacent to existing building land		all categories in priority zones for settlement development, otherwise only building areas as set out under § 23(5)(e) of the Styrian Spatial Planning Act	
public interest	Areas for constructions which have to be erected in flood discharge areas for functional reasons priority zones for industry and commerce under the Regional Development Programme						

(3) Deviating from paragraph 1(4), exemptions may be granted to close gap sites if moderate in extent, however, the ecological function of the riparian strip that may be affected is to be taken into consideration.

(4) If the HQ 100 flood discharge area has not yet been defined for a water course, the designation of open space as building land as set out under § 23 and designation for special uses as set out under § 25(2) of the Spatial Planning Act which may increase the hazard potential and obstruct discharge, shall be based on high water marks which have been defined in the wake of events. In case such data are not available either, it shall be mandatory to obtain an opinion on the possible situation within a HQ 100 discharge area from the competent authority of the *Amt der Landesregierung* (Office of the Styrian Government).

(5) Should a hazard zone map by the Forest Engineering Service for Torrent and Avalanche Control not exist for a municipality, it shall be mandatory to obtain an opinion from the competent regional department of the Forest Engineering Service for Torrent and Avalanche Control whether an area in an open space is to be designated as building land according to § 23 or designated for any special use according to § 25(2) of the Spatial Planning Act which may increase the hazard potential and obstruct discharge.

§ 5

Transitional Provisions

(1) Planning procedures which are still pending at the time this Regulation enters into force shall be completed in accordance with the law as applicable before the Regulation enters into force, however, provided that the decision regarding publication and access as set out under § 29(3) of the Spatial Planning Act had already been taken at the time this Regulation entered into force.

(2) Until the priority areas for settlement development are defined in legally binding regional development programmes or in the respective drafts available for inspection, the concentrated settlements as described in the Annex to this Regulation shall be deemed priority areas for settlement development in the region.

§ 6

Entry into Force

This Regulation shall enter into force from the first day of the month following the month of its publication, which will be …..

For the Styrian Government

Governor Waltraud Klasnic

2 COMMENTS

2.1 INTRODUCTION

67 % of the damage to the national economy caused by disasters in the Alpine regions between 1980 and 2002 was due to flood events (MÜNCHNER RÜCKVERSICHERUNG 2003). For all of Austria, flood-induced damage alone was equivalent to 1.5 percent of the gross domestic product in 2002, and for Styria it amounted to about 40 m €.

In the light of these events, Department 16, Land and Municipal Development, was assigned, by unanimous decision of the Styrian Government of 14 October 2002, the task of preparing, in close co-operation with Unit 19A, Water Management Planning and Urban Water Management, a development programme with the aim of protecting settlement areas pursuant to § 8(4) of the Styrian Spatial Planning Act.

The interface between water management and spatial planning is crucial in the effort to minimise damage caused by flood events. While Water Management provides detailed fundamentals on the event to be expected, Spatial Planning is able to minimise the hazard and damage potential by assigning appropriate land use to appropriate locations.

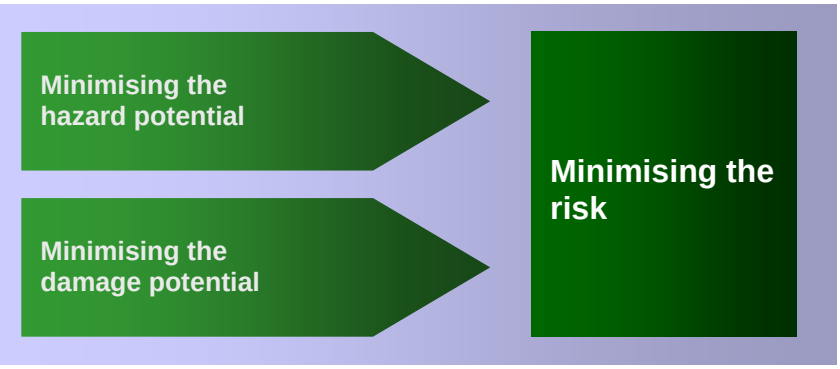
Thus, it is the key objective of this programme to identify its fields of action in terms of spatial planning and to address them in a consistent manner to minimise the risk in the event of future floods.

Hazard, Damage and Risk

Floods are natural events. The natural fluctuation of its water level is part of the normal dynamics of every water course. The level of damage caused by a flood event is influenced by the interaction of two independent mechanisms. Nature is responsible for the high water level, reinforced by anthropogenic intervention, and, thus, for the ***hazard potential****. Man erects buildings and infrastructure along water courses, thus increasing the* ***damage potential.*** *It is only the combination between the existing flood hazard and the damage potential arising from the intensive use of flood plains which creates a more or less severe* ***risk*** *(EGLI 2000).*

In terms of effect-oriented risk management, Spatial Planning must, on the one hand, minimise the hazard potential, i.e. the likelihood of the occurrence of the hazard and its magnitude, and, on the other hand minimise the damage potential, i.e. endangered assets.

2.2 MINIMIZING THE RISK ASSOCIATED WITH FLOOD EVENTS BY SPATIAL PLANNINGMEASURES



Spatial planning for the purpose of the Styrian Spatial Planning Act 1974 as amended § 1(2) is "... *the organisation of an area in a planned and forward-looking manner so as to ensure its best possible and sustainable protection in the interest of common welfare".*

Employing the instruments of spatial planning, uses should be assigned as is appropriate to a given location, avoiding spatial conflicts. To achieve the aim of minimising the risk potential in the event of floods, several fields of action suggest themselves.

The relevant aims as set out in the Styrian Spatial Planning Act 1974 as amended

§ 3 (2) Development of the settlement structure
- *taking into consideration... **economic sustainability***
- ***avoiding its exposure to dangers** emanating from the forces of nature and adverse environmental impact by choosing the appropriate site.*

§ 23 (1) Areas shall be classified as unrestricted building land only....

*3. if their development does not require economically **inefficient spending of public funds** for flood protection.*

It is important, when adopting the strategies to minimise the risk in areas affected by floods, to distinguish between Alpine tributaries, which fall within the province of Torrent and Avalanche Control, and water courses in larger valleys, for which the Federal Water Engineering Administration is responsible. However, bearing in mind that events have impacts beyond municipal borders, the general focus of the programme is on areas which are within the Federal Water Engineering Administration's scope of responsibilities.

2.2.1 Spatial planning within the scope of activity of Torrent and Avalanche Control

Wherever tributaries discharge into valleys in alpine regions, they pile up alluvial cones of varying dimensions. From time immemorial, these cones have been preferred by settlers as sites offering some protection from flooding by the inner-alpine main water courses due to their higher elevation, the higher load-carrying capacity of the subsoil and the benefits of a micro-climate, knowing that the "creators" of these alluvial cones were likely to strike back time and again.

Areas endangered by torrents and avalanches are usually smaller in size than endangered zones down in the valleys. The areas which are threatened hardly ever extend beyond the territory of a municipality. Contrary to the big retention areas in the valley, providing space for retention to mitigate the hazard potential for downstream settlements is usually not an issue in the case of tributaries.

Due to the structures described above, a great number of concentrated settlements in the alpine regions of Styria, which have developed over time, are located within Red or Yellow hazard zones as identified in the hazard zone maps established by Torrent and Avalanche Control. Since these settlement areas are already very limited in space on account of their natural topography, leave little room for further expansion and are restrained, in addition, by manifold natural phenomena (flooding by torrents, avalanches, debris flow, landslides, rockfall, etc.), it is in particular Local Spatial Planning which is challenged to respond to the respective highly diverse local situations (RC/ÖIR 2004). In addressing this issue, the following rules should be observed:

Basic rules for the general integration of hazard zone maps and their contents into the instruments of Local Spatial Planning:

- Increased efforts should be made to take into considerations the contents of hazard zone maps established by the Forest Engineering Service for Torrent and Avalanche Control in local development concepts.

- Special emphasis should be placed on elaborating appropriate development plans for larger areas designated as building land if located in the Yellow hazard zone. This allows a more holistic assessment of potential flow increases and concentrations and the initiation of remedial measures well in advance.

Basic rules going beyond the subject matter of the Regulation on how to technically handle the contents of the hazard zone maps in the context of Local Spatial Planning:

- Not allowing any new areas on hitherto unpopulated alluvial cones to be classified as building land if located in Yellow hazard zones.

- Treating Yellow hazard zones in a way similar to the provisions of this programme for zones which are within the province of the Federal Water Engineering Administration, i.e. discouraging any development of building land in the direction of endangered zones. Exceptions may be granted in less threatened Yellow areas for the purpose of consolidation or expansion of concentrated settlements.

- Areas prone to be affected by rockfall and landslides shall, as a matter of principle, not be eligible for classification as building land.

- Intensified elaboration of appropriate development plans for areas designated as building land if located in the Yellow hazard zone. This allows a more holistic assessment of potential flow increases and concentrations and the initiation of remedial measures well in advance.

Apart from the Red and Yellow hazard zones and the Blue restricted areas as defined in the text of the Regulation, hazard zone maps may show, in addition, the following separately indicated zones which are of importance for spatial planning:

- Brown zones as defined in the Regulation of the Federal Ministry for Agriculture and Forestry of 30 July 1976 on hazard zone maps refer to areas which have been identified during surveys as being presumably exposed to natural hazards other than those caused by torrents and avalanches, such as rockfall or landslides not associated with torrents or avalanches.

- Purple zones as defined in the Regulation of the Federal Ministry for Agriculture and Forestry of 30 July 1976 on hazard zone maps refer to areas which are able to fulfil their protective function only if the condition of their soil or terrain is maintained.

2.2.2 Spatial Planning within the scope of the Federal Water Engineering Administration

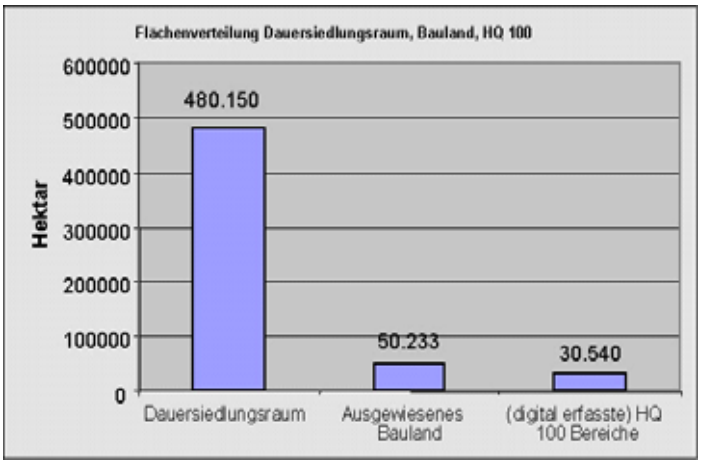
2.2.2.1 First priority: keeping flood plains free

Progressive reduction of retention areas increases the hazard potential for downstream settlements.

The demand for space by business and commerce, transport and settlements has grown tremendously in recent years. As a consequence, areas of intensive use have spread into flood discharge areas in Styria, too. Decisive for the selection of a site in close proximity to water courses – apart from given structures and a possible scarcity of land within a municipality – is, above all, the low price at which land can be obtained in these zones (SEHER 2003). Moreover, it has been shown that, due to urban sprawl, areas close water to bodies are the only ones left to accommodate infrastructure routes. These infrastructure routes are followed into zones endangered by flooding by industrial and commercial enterprises in particular.

However, building measures and topographical changes within flood plains alter the discharge pattern in the event of a flood. Filling and building up flood retention spaces in the upper reaches leads, in general, to an acceleration of the flood wave, and thus to an increase in the flood peak further downstream.

But these consequences are difficult to prove for isolated, smaller areas. In these cases, it is the cumulative effect, which means the successive and gradual reduction of discharge areas, which needs to be watched closely. An evaluation of existing digital data has shown that, in Styria, 1400 hectares of building land are already situated within the discharge areas of flood events with a one-hundred-year return period (HQ 100).



permanent settlement areas | areas classified as building land | HQ100 areas (digitised)

Nevertheless, areas endangered by floods account only for a relatively small percentage of permanent settlement areas suited for settlement activities in Styria. Also, given the fact that there are still major reserves of unused building land, there is very little to no need, from a perspective over and above municipalities, to classify additional zones extending into flood plains as building land.

In 2001, Styria (not including the capital city of Graz) had as much as marginally over 11,000 hectares of building land in reserve, which is 25 % of all land classified as building ground.

One quarter of land classified as building ground in Styria is still unused.

As far as the distribution of these reserves is concerned, they are not very widely dispersed over Styria's districts. At about 40 %, and peak values of over 60 % in some places, the biggest spare capacities of building land are available in industrial regions.

To remedy this situation, an amendment to the Styrian Spatial Planning Act came into force on 25 March 2003 (resolutions of 24 September and 10 December 2002 adopted by the *Landtag*, the Styrian Parliament).

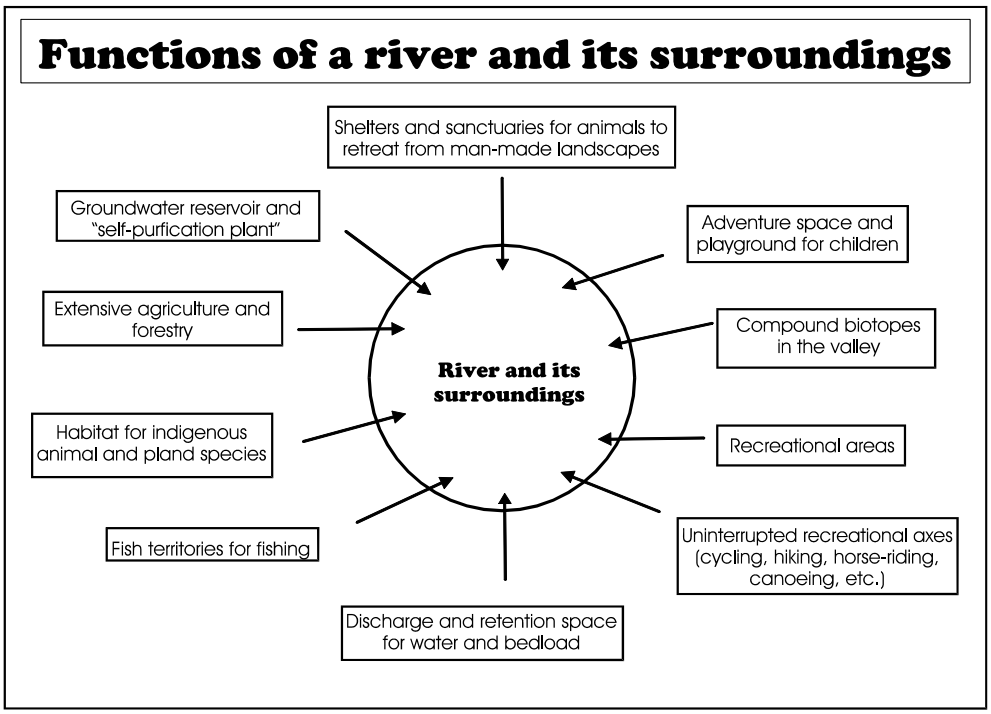
The law now makes it possible for municipalities, by employing appropriate instruments, to mobilise sites which have been classified as building land but have not been available for development so far. These instruments are:

- private enterprise measures
- setting deadlines for development
- defining restricted areas

It is to be expected that these instruments will encourage the mobilisation of hitherto unused building sites in the coming years. Therefore, from a perspective beyond municipal borders, it will be difficult to justify any further reduction of retention areas along the Styrian water courses by offering "demand" as an argument.

Compatible uses of open space in areas subject to flooding shall be pooled.

In the interest of a holistic spatial planning approach and with a view to the aforementioned arguments within flood areas, uses such as agriculture and forestry, nature conservation, recreational axes such as cycling and riding tracks, etc. should be pooled, avoiding the construction of any obstacles that may hinder discharge.



Buildings and installations within flood discharge areas enhance the damage potential

In the past four decades, the damage caused by natural disasters to national economies has increased worldwide by a factor of seven. This increase is chiefly due to the presence of assets of ever growing value at sites which are exposed to hazards (MÜNCHNER RÜCKVERSICHERUNG 2003).

Buildings, necessary infrastructure (sewers, roads, parking lots) within areas prone to flooding invariably increase the danger potential. Even if protected against a flood event, there is a residual risk, for instance because of a possible failure of technical defence works.

Damage inflicted in the case of an event can be roughly divided as follows (EGLI 2000):

- personal injury (bodily, social and mental harm)
- environmental damage (leakage of mineral oil products …)
- monetary damage, which can be subdivided into:

    1. direct economic damage (fixed and movable inventory, buildings, etc.)
    2. indirect economic damage (loss of value-added, infrastructure problems, expenditure to make the damage good again, etc.)
    3. long-term consequential damage (impairment of sales value, abandonment of production sites, etc.).

A major part of the damage caused by flood events is covered by public funds.

As far as monetary losses are concerned, these are borne by the private parties affected only in part. An assessment of the losses incurred in Austria during the flood events of 2002 showed to what large extent public funds were required to undo the damage which had been caused (HABERSACK 2003):

- The major part of the supply infrastructure is financed by the Federation and the Laender, while municipalities and private parties contribute a small share one. During the floods of 2002, in addition to traffic infrastructure, water supply and waste water disposal facilities within the inundation areas were particularly severely affected.
- In settlement areas in particular and for industrial plants situated within high water marks, requests are usually voiced that they be protected against HQ 100 events, using public funds. When planning such defence works, it is not only their high construction and maintenance costs which have to be considered but also the very high repair costs after a flood event. (The damage of the 2002 floods to facilities and industrial plants within the scope of responsibility of the Federal Water Engineering Administration in Upper and Lower Austria alone amounted to 45 m €.)

Nevertheless, the largest part of public funds is spent on a variety of services provided to private persons or parties. It is above all the reduced utility value of buildings and inventory which is compensated for by public payments.

The most important parameters to assess the hazard potential are flow velocity and inundation depth. But monetary damage to buildings, inventory and infrastructure does not only occur in zones of inundation of great depth and high tractive stress. Industrial plants in zones which are less deeply flooded increase the damage potential and hence the residual risk as well, although to a lesser extent.

All in all, the level of damage to buildings and infrastructure affected by a flood event is determined by a number of parameters such as inundation depth, flood duration, flow velocity, flood-rise speed and sediment load (ISR 2002).

Early flood warning and rescue actions protect and save human lives

To minimise flood damage, early warning as well as rescue actions and defence measures are crucial to protect human lives and movable property.

2.2.2.2 Second priority: protection of settlements

Active flood protection requires substantial public funding

Active flood protection as an ongoing task of Unit 19B requires substantial public funding, even if PPP (Private Public Partnership) models are being more strongly encouraged than in the past. Since spatial and hydraulic conditions vary considerably, average costs to protect sites are difficult to forecast. Nevertheless, existing figures suggest that it will take decades until full protection of settlements currently lying in inundation areas has been achieved.

Active flood protection - costs – (examples)

Project Grimmingbach brook:
1,700,000 € *to protect approx. 53 hectares against a HQ 100 flood event*

Project Gradnerbach brook:
910,000 € *to protect approx. 3.3 hectares against a HQ 100 flood event*

Construction budget of the Federal Water Engineering Administration for Styria in 2003:
14.4 m *€ incl. immediate measures, planning, etc.*

When deciding which protective measures to take, a case-to-case approach is advised as regards the hazard potential, however, the residual risk if engineering measures are implemented must also be taken into consideration:

- engineering measures may fail (breaking of a dam...)
- design events may be exceeded (flood in the Kamptal valley 2002 approx. > HQ 500)
- events may take a development different from the forecast scenario (blockage...)

So, designating new areas in endangered zones as building land invariably increases the damage potential, albeit to a lesser extent, even if they have been protected against a HQ 100 event.

Active flood prevention needs reserve areas along water courses

Active flood protection needs reserve areas along water courses. It is of particular importance to ensure that any measures taken will not have an adverse effect by inhibiting or complicating any flood protection measures for existing objects which may be necessary in the future.

2.2.2.3 Exemptions

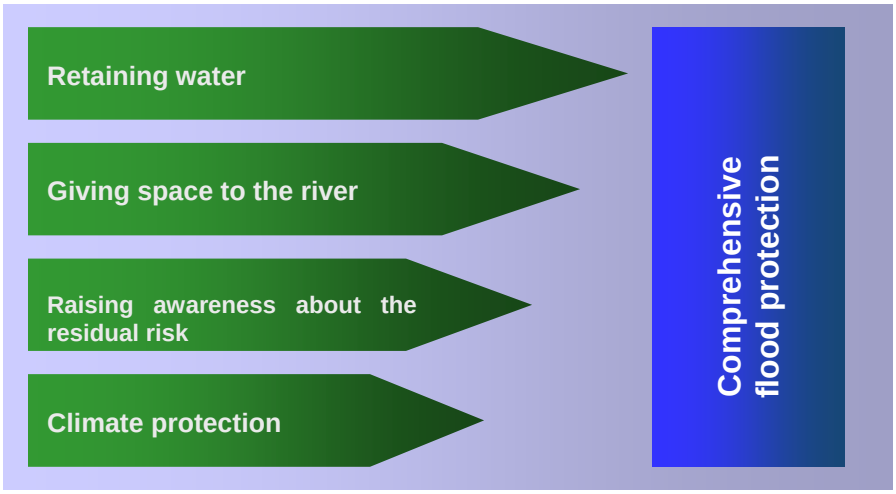
In seeking to strike a balance between mitigating the risk in case of flood events and fostering the development of settlements and economic structures, exemptions from the principle of keeping HQ 100 areas free may be granted for very small projects or cases of legitimate public interest.

However, any such exemption is subject to the condition that protection against a HQ 100 event at least by engineering measures may still be possible.

2.2.3 Comprehensive flood protection

Comprehensive flood protection extends beyond the areas which are inundated in the event of a flood, both as far as space and the subject as such is concerned.

Apart from the priorities of keeping discharge areas free and of protecting assets by engineering measures, it encompasses the need to address issues such as catchment area management, climate protection and awareness raising.



2.2.3.1 Water retention in the catchment areas

In the course of the past decades, many catchment areas of Styrian water courses have been rendered impermeable by sealing. This has eliminated in part or completely functions such as water retention by vegetation (interception), retention in troughs, water uptake by the soil and geological substratum and slowing down the flow of water in the soil (interflow). Sealed areas reduce storage potential, speed up flow and, thus; increase and accelerate flood peaks. Similar effects, although less pronounced, are to be observed on arable land. It has been noted that water retention by areas covered with vegetation decreases successively from forest areas to grassland and arable land.

While it is true that during a flood event the water retention capacity of these catchment areas is diminished because of the high saturation they have already undergone during the disaster, their water retaining potential is nevertheless crucial in attenuating the magnitude of disasters.

The share of built-up and sealed areas in relation to all catchment areas is a variable which can be influenced by spatial planning instruments. In Styria, the average share across all districts was between 8 and 11 percent of all permanent settlement areas in 1998/99 and has been going up very dynamically ever since. Land consumption in Austria has been estimated to amount to 15 to 25 ha/day, which corresponds to a per capita land consumption of 7 to 12 m ²/year (UBA 2001).

However it is not only the ratio of sealed and built-up surfaces which is of significance for the water retention capacity in the catchment area but also their spatial distribution. Close-meshed networks of settlements and road surfaces withdraw water from the landscape much more rapidly than concentrated settlement and transport structures. This requires that special emphasis be placed on settlement development, on the one hand, and on preserving the large open landscapes which still exist, on the other.

This need is addressed in the instruments of spatial planning, both at local level and beyond , by identifying and promoting areas of concentrated settlement and by keeping multi-functional open-space systems such as agricultural priority zones, green belts, etc. free from further building activities and sealing.

2.2.3.2 Raising awareness of residual risks

Against the background of the disasters which have occurred in recent years and decades, the term 'risk awareness' is gaining increasingly in importance. It describes the extent to which people who find themselves in dangerous situations are aware of the danger potential and to what extent people who deliberately act in a risky way are aware of the magnitude of the risk which they have taken.

It has to be acknowledged that floods are part of our environment. However, if flood events fail to occur over a longer period of time, their impacts tend to be forgotten very quickly. As they disappear from the media, public interest, and hence risk awareness, fades rapidly. Bearing in mind the public duty of ensuring the mitigation of the risk-potential on a long-term-basis, this has two serious consequences:

- Public outcry during and immediately after the event. Blaming the state for its failure to minimise the risk, coupled with claims for damages, etc. …

- The difficulty of gaining acceptance for the need to keep flood plains free in the interest of the public versus usually clearly formulated and strongly lobbied interests in periods in-between flood events.

2.2.3.3 Climate protection

Whether, and to what extent climate change contributes to the ever increasing damage caused by atmosphere-induced natural disasters is still difficult to assess and a matter of hot debate. However, it is widely agreed that there is a connection between a steady warming of the atmosphere and the increase in frequency and intensity of extreme events (MÜNCHNER RÜCKVERSICHERUNG 2003).

The activities launched in Austria for climate protection, focussing in particular on the further reduction of greenhouse gases, deserve to be mentioned in this context. The influence which can be exerted by Spatial Planning is, in the first place, by reducing individual motor traffic, the biggest emitter of greenhouse gases. To achieve this, it is necessary to discourage the on-going separation of basic functions of existence and to encourage settlement structures to provide local public transport services.

2.2.4 Comments on the transitional provisions

When planning allocation of land in a municipality, the spatial planning authority shall pay due regard to the development in the municipality as a whole, ensuring, in particular, the protection of vested rights, continuity, and the consistency of the law, as repeatedly stated by the Higher Administrative Court. For areas already designated as building land, the Municipal Council shall review, based on actual events and existing planning documents, whether these are endangered or not. Depending on the outcome of any such review, the Municipal Council shall, in accordance with the Spatial Planning Act, designate an area as land suited unreservedly for building activities, for development or requiring rehabilitation, or decide on retro-zoning. If the Municipal Council intends to extend the existing building land, the programme for a flood-safe development of settlement areas shall govern the conditions under which such extensions or new designations as building land shall be permitted.

2.2.5 Need for action in other special administrative laws

While establishing this programme, it became apparent that, while spatial planning measures are a crucial component in mitigating the risk in the event of a flood, there is also need for action as regards other administrative laws. There are ways and means by which it is possible to circumvent the objectives defined in the programme by referring to provisions in the building code (landfills in the open landscape). Therefore, it is recommended that these laws be amended accordingly:

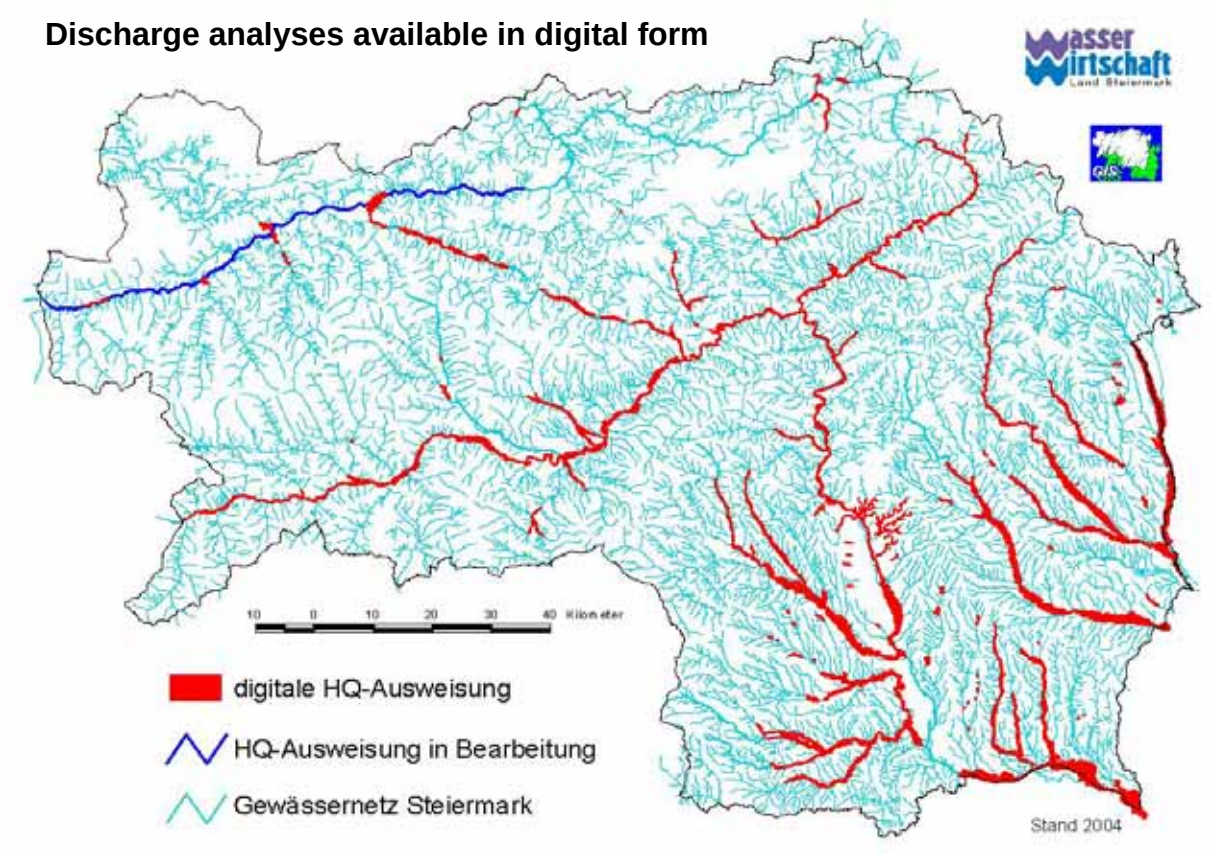
- Water law: The obligation to obtain approval for measures planned in flood discharge areas should be extended from HQ30 inundation zones to HQ100 inundation zones.
- Building code: It is recommended that aa task force be set up which shall determine any amendments to the Styrian Building Code which may be necessary regarding the construction or subsequent protection of buildings in endangered zones – similarly to the amendments to the Salzburg Law on Building Principles, the Building Control Law and the Building Engineering Law adopted in 2004 – as well as regarding any changes of terrain in open space, and that the necessary proposals be prepared.

3 ANNEX

3.1 STATUS OF HQ100 CLASSIFICATIONS IN STYRIA

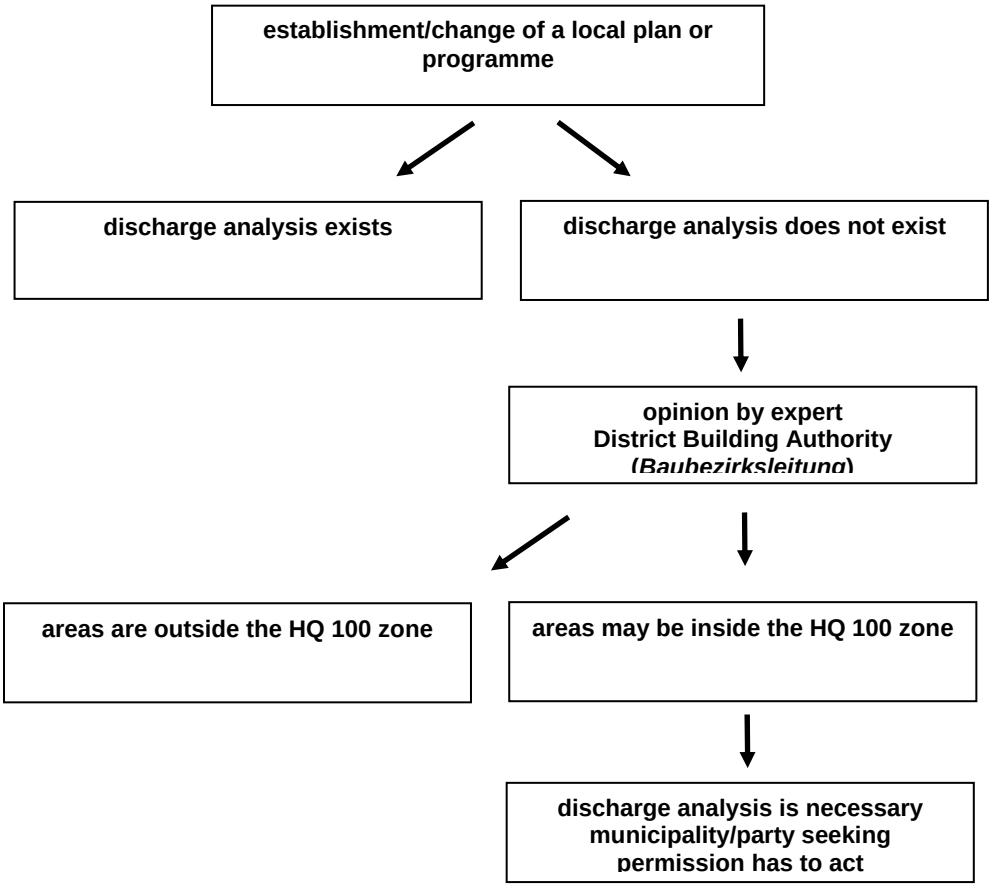
Styria's water courses have a total length of about 14,000 km. Approx 8,500 km fall within the province of the Forest Engineering Service for Torrent and Avalanche Control, while the Federal Water Engineering Administration is responsible for about 5,500 km.

Since 1980, HQ30/ HQ100 high water marks have been identified for a length of about 1,500 km of water courses for which the Federal Water Engineering Administration is responsible. These are available in digital form. These high water marks are to be incorporated into the zoning maps of the municipalities.



The chief target was to analyse Styria's main rivers such as Mur, Mürz, Raab, Kainach etc. Smaller water courses were only included if their flood discharge areas were under mounting pressure from building land. Apart from the high water marks, these analyses also contain information on water depth and flow velocities during flood events.

3.2 APPROACH IF NO DISCHARGE ANALYSIS AVAILABLE



3.3 STATUS OF THE HAZARD ZONE MAPS ESTABLISHED BY THE FOREST ENGINEERING SERVICE FOR TORRENT AND AVALANCHE CONTROL IN STYRIA

From the total of 543 municipalities which exist in Styria, 346 fall within the province of the Forest Engineering Service for Torrent and Avalanche Control. For 170 of these 346 municipalities, approved hazard zone maps exist as of today, covering the core areas of the municipalities concerned. So far, the western, i.e. the alpine, region of Styria has been mapped to a large extent. Plans are to have all relevant areas covered by about 2010 (ÖIR/RC 2003).