Does the Convention for the Protection of the Alps Preserve Its Water Resources?

Alpine streams are in jeopardy: the space allotted to streams and rivers is often inadequate, water quality is poor, and discharge is too low. Since the Alps are of primary importance to Europe's water supply, it is urgent that we take action. As early as 1991, the European Union and countries that share parts of the Alps agreed on a Convention for the Protection of the Alps. In order to minimize the risk to streams and rivers and to increase awareness of the importance of our water resources, the convention will soon be extended into a water protection protocol.

The importance of the Alps as the water resource of Europe, where major rivers like the Rhine, Rhone, Drau, Durance, Inn and Po have their origins, is generally recognized. Despite this fact, alpine streams and rivers are not getting the attention they deserve. Of the 30 000 kilometers of streams in the Swiss Alps, 12 500 kilometers of medium and large rivers are in a condition that is far from their natural state. The majority of the corrections to these rivers were made in the last 200 years in response to ever increasing demands for flood protection and hydroelectricity. If one attempted to revitalize all of the "engineered" alpine streams using the current revitalization rate, it would require over a 1000 years [1]; therefore, we need to act immediately in order to protect streams that have not yet been altered and to revert manipulated streams back to more natural conditions. What is urgently needed are governmental regulations that transgress national boundaries.

Alpine Streams Perform a Number of Functions

The alpine region is shaped by anthropogenic influences, fragmented by roads, buildings, and water works. In this environment, streams are the only natural networks that are largely contiguous and cover the entire area. Economically speaking, streams and rivers are critically important for hydroelectric power generation, in supplying drinking water, and for tourism in cases where their unique beauty attracts people; however, with an annual discharge volume of over 200 billion m^3, streams and rivers are not just a positive element of the landscape. They represent a substantial, potential danger that shapes all areas in their immediate vicinity [2]; the devastation of various parts of Europe during this past summer's flooding demonstrates this rather clearly (Fig. 1).

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Fig. 1: A trail of devastation after a flood event.

Acute Threats to Alpine Streams

There are a number of ways in which alpine streams are threatened. We would like to highlight some of them:

- Hydroelectric *power generation* is one of the more delicate problems. While electricity from hydroelectric power plants has been praised over the last 100 years for being "domestic", "clean" and "renewable", the ecological impacts of this form of energy generation turns out to be more severe than originally assumed. Hydroelectric power plants play a significant role in the finances of mountain villages, although this economic gain comes at an enormous environmental cost (see articles by A. Wüest on p. 18 and M. Fette on p. 21).
- The *sale and privatization* of springs and streams poses a new kind of threat. In Switzerland, little attention is given to this risk since most streams, as well as the water supply systems themselves, are in public hands. International companies like Nestlé, Coca Cola and Danone have secured their access to drinking water and established a strong position in the water market. We can only speculate what effects this may have on the environment.
- According to unofficial sources, the total number of buildings in Switzerland tripled between 1951 and 1991. *Settlements and the transportation infrastructure* move ever increasingly into the domain of streams and

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Fig. 2: Many mountain streams that were once roaring are today left with very low in-stream flows and all the consequent disadvantages.

rivers. Damage during flood events demonstrates that the buffer zone is often inadequate (Fig. 1).

- The impact of agriculture on streams continues to be a problem. In addition, it was recently determined that sewage treatment plants are unable to completely remove hormonally-active compounds, so-called endocrine substances. These compounds show effects on animals and humans even at very low concentrations.
- Even if *canalization* is virtually banned by the current Swiss legislation, we should not forget that over the last few decades, the annual loss of natural streams has been at the order of 50 kilometers per year [3].

Is the Convention for the Protection of the Alps Sufficient?

The Convention for the Protection of the Alps was signed in 1991 by the EU and by countries that partially lie in the Alps, namely Germany, France, Liechtenstein, Italy, Monaco, Austria, Switzerland and Slovenia. The framework convention, stating the basic principles for the protection of the Alps, has been in force since 1996. It is remarkable that the convention treats the entire region of the Alps as one entity, stating that it represents an extremely diverse and complex environment that is occupied by eight countries and 8500 communities, covers an area of 190 000 km^2 and is home to nearly 14 million people [4, 5]. The countries signing the convention have committed themselves to the "principles of prevention, polluter pays, and cooperation". The goal of the convention and its protocols (Tab. 1) are the institution of integrated policies for the preservation and protection of the Alps through prudent and sustainable use of the natural resources.

Protocol	Signed by Switzerland
Urban planning and sustainable development	16.10.1998
Nature protection and landscape conservation	16.10.1998
Mountain agriculture	16.10.1998
Mountain forests	16.10.1998
Soil conservation	16.10.1998
Tourism and leisure	16.10.1998
Energy	31.10.2000
Transportation	31.10.2000
Arbitration	31.10.2000
Monaco protocol	20.12.1994

Tab. 1: The ten protocols of the Convention for the Protection of the Alps [4].

Alpine streams and their sustainable use are mentioned in the convention. The *framework convention* explicitly demands that healthy water systems be preserved or that they be restored. Focus areas include stream protection, hydraulic structures that leave the stream as natural as possible, and the environmentally-friendly use of hydroelectric power. In addition, the preamble to the protocol on *Environmental Protection and Nature Conservancy* emphasizes the importance of streams for the preservation of species diversity. The Energy Protocol stresses that streams are of utmost importance to ecological diversity, for drinking water and for energy production; however, all these demands and declarations are not specific enough when it comes to their practical application. We need an independent water protocol that spells out the specific functions and needs of streams and rivers and clearly states the risks that are currently threatening our streams.

Expectations for a Water Protocol

In Switzerland, there is general consensus on the most important points that such a water protocol should address [1, 6–9]:

- **Preservation of natural streams:** The remaining natural streams must be completely protected. We need to prevent the speculative sale of streams (drinking water).
- **Adequate space for streams:** The basic requirement is an adequate stream cross-section such that flood events do not cause damage to adjacent areas. Furthermore, there has to be enough room for appropriate ecosystems to function and for linkages between these systems. This is the only way to reestablish natural aquatic, amphibian and terrestrial diversity. Recreational needs of humans should also be considered. Contamination by agricultural practices needs to be minimized by establishing adequate buffer zones.
- **Sufficient Discharge:** A balance needs to be found whereby in-stream flows are adequate for the preservation of aquatic habitats and the landscape, and where flow volumes are sufficient to approach natural flow volumes and allow for sediment transport (Fig. 2).
- **Adequate Water Quality:** Contamination of streams by solids and dissolved materials needs to be minimized. A temperature regime close to natural values must be guaranteed.

Since the need for a water protocol has not been recognized on a political level, there is much work to be done before it is realized. Only if the above demands are translated into political action, can we hope that our alpine streams will fulfill their diverse functions in the future.

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[1] BUWAL (2002): Grundlagenbericht zum Leitbild «Landschaft 2020». Noch unveröffentlichte Studie des BUWAL, Bern.
[2] CIPRA (1999): http://deutsch.cipra.org/texte/publikationen/Info_52/CI52_Blaues_Gold.htm
[3] ARE und BUWAL (2001): Landschaft unter Druck. 2. Fortschreibung Februar 2001, 50 Seiten, EDMZ Bern.
[4] CIPRA (2002): http://deutsch.cipra.org/texte/alpenkonvention/alpenkonvention_hauptseite.htm
[5] Bätzing W. (2002): Die Bevölkerungsentwicklung der Alpen 1871–2000, Sonderbeilage zum CIPRA-Info Nr. 65.
[6] Pro Natura (1998): Mehr Raum für unsere Fliessgewässer, ein Gewinn für Mensch und Natur. Beiträge zum Naturschutz in der Schweiz, pro natura Basel *19*, 48 S.
[7] BWG und BUWAL (2000): Raum den Fliessgewässern! Faltblatt, Bern.
[8] BUWAL (2000): Leitbild Fliessgewässer Schweiz, interner Entwurf.
[9] Rodewald R. (2001): Der Wasserschatz der Alpen im internationalen Kontext. Zusammenfassung des Referats, ANL-Fachtagung «Die Alpen – ein kostbares Wasserschloss», November 2001, Bad Reichenhall, unveröffentlicht.