

## **Patrimonial and integrated water management in alpine tourist resorts. The situation in Crans-Montana-Aminona and Nendaz (Valais, Switzerland)**

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Historically, the question of access to water supplies and their subsequent control has played an essential role in the settlement and development of alpine regions. During the 19<sup>th</sup> century, the industrial development in the main alpine valleys was, without doubt, made possible by the straightening of the major alpine rivers. More recently, the development of hydro-electricity and tourism activities can be considered as the most important factors in stopping the population move away from the isolated alpine valleys. But just how is this resource currently managed in the Alps? Is it oriented towards sustainable development as the UN stipulated in 1992 with its Agenda 21? Do the current management methods encourage the most economic, the most rational and the least environmentally damaging solutions or are they characterised more by wastefulness and a debasing of the resource? These are just a few of many similar questions that can be asked in the context of the socio-economical and environmental transformation that characterises the second half of the 20<sup>th</sup> century.

This thesis will address the current situation of water resource management in two tourist resorts in the Valais region of the Swiss Alps, starting from a **paradoxical observation**: that the Alps on one hand, are considered to be Europe's water tower and yet on the other hand, as the last decades have shown, are not excluded from water shortages, quality deterioration and conflicts over this precious resource. The question is to know whether these conflicting situations are due to a definite shortage of this resource, in quality and/or quantity, or whether they are due more to ill management of the resource.

For the first part, a **theoretical frame** was constructed on the basis of existing literature. Because of the system characteristics of the resource and its position at the interface between the natural system (the hydrosphere) and the different exploitation systems used by man, it seems that the best management method can only be an integrated and patrimonial approach. **Integrated management** means a horizontal integration of the resource, the uses and the actors, as well as a vertical integration of the different methods of management. It's a question of on one hand, keeping the balance between the offer (the resource) and the demand (the use by different actors), and on another, to keep a balance between the upstream and the downstream in the resource flow, as well as between the different levels of the system. The concept of **patrimonial management** considers water not only as a resource to be developed but also as a common good essential to the survival of a society. This implies the adoption of balanced management methods, oriented towards a sustainable protection of the resource, in quality as well as quantity.

This integrated and patrimonial management model is then adapted to the **specific case of alpine tourist resorts**. These are characterised on one hand, by very important seasonal population fluctuations (between high and low seasons), and on the other hand, by a selection of uses, mainly four types in the Alps - drinking water, irrigation (in the dry mountains like the central Valais), hydro-electrical production and tourist use. Water in the tourist industry being used as an element of the original offer (water as landscape) as well as a derived element (water as an infrastructure or tourist service).

The second part of this thesis, of an empirical nature, confronts the model to the reality of two tourist resorts in the Valais Alps, **Crans-Montana-Aminona and Nendaz**. These two resorts were chosen because of various differences - structural, politico-administrative, natural, etc., which allow a comparative approach.

The main results are as following:

- In both resorts, the **resource is currently sufficient** to satisfy all the needs. The shortage situations and conflicts are thus due to management problems and not because of a definite shortage of the resource.
- Overall, in both resorts the current management methods can not be considered either as perfectly integrated or as patrimonial. Three groups of problems prevent a properly integrated and patrimonial management.
- The **sectorial problems** affect management sub-systems in particular. They could be due either to a bad structuring or a disfunctioning of the sub-system. An example of bad structuring is that of

the drinking water distribution system in Crans-Montana-Aminona. Organised around six independent distribution services, traced over the politico-administrative borders which in spite of the obvious unity of the resort on the High-Plateau, actually forms one urban structure spread over four communes. An example of sectorial disfunctioning is the irrigation *consortages* - management units inherited from the traditional agro-pastoral society but which are actually inadequately grafted onto a new economical context.

- The **intersectorial problems** affect the coordination between two or more management sub-systems. They are generally due to a mutual lack of information or a unbalance between the sectors of the different water uses, themselves linked together for historical, economical or legal reasons. These conflicts are sorted out either by negotiation or by various legal channels. The different cases studied show a lack of problem anticipation. As every type of resource use is managed differently, conflicts are created when the separate projects of one or another sectors interfere with the geographical position of the others. The major conflicts have either an economical or an environmental aspect.
- The **territorial problems** do not only affect the management systems structure or their functioning but also on their landmark. They are created generally when the territorial limits of one or another sub-system do not coincide with the limits of the others. This is particularly the case of the drinking water distribution on the Haut-Plateau. The availability of the resource is determined by the natural limits (catchment basins, increase of availability with the elevation in altitude, etc.) and the demand for the resource depends largely on the economical layering in respect to the altitude (agricultural villages on the valley slopes and tourist resort at 1500m altitude). Whereas the structure of the distribution systems is grafted onto the administrative structure (six political communes) which cuts perpendicularly across the economical structure.
- Currently, these three groups of problems are difficult to solve because of the absence of an effective information system. The decisions taken by the actors are, therefore, often marked by the **lack of a global view** of the structure and the functioning of the water resource management system.

Four propositions are suggested with the intention of increasing the degree of integration and sustainability of the systems studied:

- An improved suitability between the borders of the natural system and the resource use systems is needed. A suggestion is to create a series of intercommunal management structures to coincide more or less with the **catchment basin limits**.
- Parallel to these new structures, some **intersectorial coordination organisations** should be created, on the intercommunal level as well as the cantonal level. There is also the Valais canton's Service of Urban Planning's idea of a coordination platform.
- These two suggestions are in the interest of improving the degree of integration in the system but they do not guarantee necessarily its sustainability. For this, it is suggested to adopt at the sectorial as well as global levels, an **efficient planification process**.
- The fore-mentioned can only multiply their effects if they are based on dependable information about the actual and future state of the system. From experience, the information to be found is actually very partial. To remedy this situation, the introduction of **high-performance information collection, management and development systems** on the structure and the functioning of the water system is recommended.