

Resource Conflicts in Mountains: Sources and Solutions

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Conflicts in mountains develop when different needs compete with each other over limited space and time and on a more severe level, when international boundary issues arise in remote areas. From a political and geographical point of view, mountains represent a special environment in terms of topographic, social and economical constraints. Increasing pressures induced by anthropogenic change and uncertainty of climate change foster the emergence of double-loop conflicts. These characteristically develop at the local scale. Often conflicts occur at the interface between traditional, primary activities and new developing economic activities that have a less environmentally sustainable approach towards natural resources. Nowadays the strain on sharing resources accelerates the tip-over point towards conflicts.

In this article, the sources of conflicts will be analysed, a case study of conflicts between a farmer and the tourism industry described and possible conflicts resolutions and prevention suggested. The conclusion summarises the current dimensions of conflicts.

Sources of conflicts

There are many sources of conflicts in mountains and they have a number of common sources. Conflicts usually occur when some or all of the physical, ecological, societal, cultural and economic fields confront each other. In the absence of shared knowledge of problems and/or consensus major distress, resource shortage or even war can result. For example in the year 2000, 18 of the world's 28 armed conflicts took place in mountains (Smethurst, 2000). Conflicts characteristically occur at a very small scale, as a result of increasing population pressure or from new problems associated with climate variability and uncertainty. They are typically caused by a lack of cooperation between the public and private sector and enterprises as well as opposing economical and ecological values. Moreover, long term versus short term visions can hide the dimension of a conflict.

Cultural, societal and ecological sources

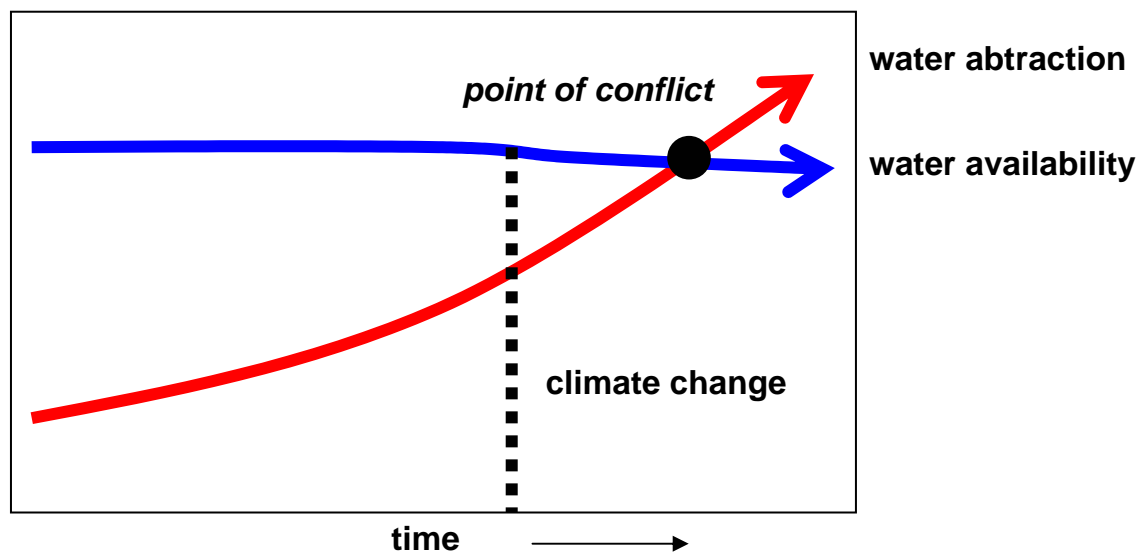
In the Himalayas, conflicts have developed between natural resources, private enterprises and government policies. For example, areas that have been transformed into nature reserves can no longer be exploited for gathering natural medicinal herbs or for allowing tourists to traverse certain areas, so that the livelihood of local people is menaced.

Other societal conflict sources include population migration and immigration, resulting in population deconcentration and concentration and unequal age distributions linked with growing expectations versus needs (Zucca 2006). In this situation, new incoming populations can menace the cultural or economical values of local communities. Conflicts often develop where there is a lack of awareness, perception, understanding acceptance and evaluation of different needs or a lack of information and communication. Indeed, stereo type conservative approaches versus stakeholder participative approaches often result in clashes.

Physical, ecological, economical sources

Often it is the limited availability or misuse of natural resources that leads to conflicts, in particular where demand is higher than offer. Thus, for example, in order to maintain and ameliorate the tourism industry in mountains, more and more local natural resources are exploited (Hudson, 1996). Since climate change is simultaneously changing the supply of water and snow and the demands of the tourism industry are steadily increasing, more and more water resources have to be exploited to produce artificial snow and compensate for the

decreasing supply of snow resources (de Jong 2007 b). Increasing water consumption by tourism is already putting a high pressure on water resources in addition to water-intensive techniques compensating for lacking snow, leaving less available for local communes and tourist resorts (de Jong 2007 a). At the same time, climate change is causing greater variability of water resources in the winter months, so that less is available for the different activities. Finally, once the demands for natural resources associated with these economical activities has surpassed the threshold of supply, a lack of the resource occurs and a conflict develops. An additional strain is imposed on the aquatic ecosystem when the minimal ecological discharge is not respected during times of water conflicts,. Since mountains are important water suppliers for the lowlands (Viviroli et al 2003) water conflicts in the upper catchments may have far-reaching impacts.



Model illustrating conflict development based on water demand and supply in mountain regions (by de Jong).

Other examples of conflicts concern land claims for pasture versus tourism infrastructure, such as housing and snow making infrastructure. The zonation and disintegration of core zones may involve conflicts with wildlife habitat. Other types of conflicts commonly develop between the requirements for minimal ecological discharge and the discharge artificially regulated by hydropower and energy prices.

Case study of conflict between farmer and tourism industry

An actual example of a conflict in mountains is the case study of Courchevel, French Alps. Here a conflict has arisen over pasture size and quality between an alpine farmer and the tourism industry, more specifically the ski lift operators of the Trois Vallées (Casanova 2007). With the increasing uncertainty of snow depth and duration due to climate change, more and more artificial snow is manufactured to compensate for lacking natural snow. This requires ever increasing amounts of water, which are increasingly derived from the explicit construction of artificial reservoirs. In this case study, two major points are associated with the conflict. The first concerns the surface area occupied by the construction site of a large artificial reservoir (125 000 m³) that is being built to store water and fabricate artificial snow in a snow factory at 2500m. The water for the reservoir will be pumped up from the Rosière

dam (1500 m) and also fed from the reservoir of Biollay at 2000 m. Although the reservoir was estimated to cover only 2 hectares, the farmer who rents the land for grazing his cattle on the high altitude pastures in summertime estimates that between 10-15 hectares of land were rendered unusable for grazing. Due to the reduction in grazable land, the farmer had to reduce 25% of his herd and thus suffered a loss in milk production worth Eur 30 000.

The second point concerns the dust emitted by the building site which has caused spores to settle on the grass which are ingested by the cows and thereby enter into the milk. Once the milk is heated, the spores start to develop and destroy the cheese, a process often only perceived after several months. The dust from the building site contains approximately 30 times more spores than usual. The conflict was brought to the attention of the ski lift operators and local commune by the farmer and a monetary compensation is in discussion. The region has invested 7 million Euros into this reservoir infrastructure. However, the conflict is not only temporary, since the pasture that was removed over a large surface to build the artificial reservoir will not grow back quickly in this type of fragile environment. Also, in future 900 000 m³ of water will be available per year for snow making from the reservoir and it is questionable whether there will be sufficient water available at the right time of the year for the agriculturalist.



Preparatory works for the construction of an artificial reservoir (125 000 m³) at Ariondaz (2500 m) to store water for artificial snow making for the ski lifts of Courchevel, French Alps. (Bejamin Damelet 2007)

Conflict resolution / prevention

Conflict identification, prevention and resolution remains one of the most difficult tasks. Some issues that are important for resolving conflicts include the development of awareness, perception and responsibility within the society, the creation of opportunities for multi-stakeholder discussions, effective communication and planning, the creation of actual and potential scenarios for the relativisation of conflicts within their environment.

Conclusion

One primary problem of conflicts related to climate change and population pressure in mountains is the social denial of the problem (Norgaard 2006). Scale comparisons dominate and conflicts are often trivialized locally due to oversimplified statistical or sectorial comparisons. Although sources of conflicts are frequently known, the problem is often ignored and an adaptation strategy resembling as much as possible the business-as-usual-scenario is selected. This often occurs independently of the environmental or economical cost-benefit considerations.

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