172 Sewage management in remote protected areas: high mountain challenge

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Introduction

Protected areas around the world have to deal with the problem of tourist pressure. Providing access to the most valuable natural areas has a great impact on the environment. This task is especially difficult in the core zones of the protected areas which are remote and far from the urbanized zones. One of the many identified threats associated with the intense tourist traffic is sewage pollution (Lebersorger et al. 2010, Weissenbacher 2008, Andreottola 2003). In the Tatra National Park the problem of sewage pollution becomes more and more crucial over the years. The reason of that is gradually rising number of tourists (almost 4 million of tourists in 2019 and 2020) who visit not only tourist trails and other specially dedicated areas but also trespassing the fragile natural habitats. In mountain shelters, located in the core zone and mostly in remote areas generally biological wastewater treatment plants are used, which very often hardly deal with the enormous amount of sewage. What is more faecal contamination occurs also nearby the tourist trails. As a result this situation is causing pressure on the nature, including the pollution of streams and ponds. Around the world there are many different solutions regarding the sewage management. The aim of this research is to gather and analyse these solutions in order to recommend the best options for the protected areas, especially remote.

Methods

In order to gather information about the sewage management in the protected areas a questionnaire was prepared and send to 143 national parks around the world. For the purpose of the investigation mostly national parks with alpine character and tourist infrastructure remote from urbanized areas and difficult to install a sewage system have been chosen. Filled questionnaires have been received from 27 national parks, located in 16 countries. The questionnaire consisted of 11 questions. First 8 questions were related directly to the sewage management. It was important to determine if sewage issue is occurring in the protected areas. Last 3 questions were focused on scientific research and field observations regarding the influence of sewage on nature as well as the planned investments related to the sewage management in the protected areas.

Results

Answers obtained from 27 national parks were divided into two main groups. In the first one, which consisted of 11 national parks sewage management was an issue. In most of them, toilets are located in the core zone in locations such as: mountains huts, accommodation or gastronomic facilities, centres of education, tourist trails or entrances to the national park. Sewage is managed there in different ways depending on the local conditions, which generally vary from dry toilets, biological or mechanical wastewater treatment plants with draining in the underground, to septic tanks and sealed bags. In national parks which used sealed bags to dispose sewage the most common kind of transportation is helicopter but horse, motor boat and of-road vehicle are also used. National parks which used dry wells collect sewage in reservoir without using any chemicals and then transport them to the valley. In 4 national parks sewage system is used and sewage is transported even up to 10 km from the area of the park and treated in collective wastewater treatment plants and biological or mechanical wastewater treatment plants. There are not many scientific researches regarding the influence of sewage on nature. But those which were conducted showed that sewage might cause a serious threat to high-mountains streams and lakes. Despite the lack of scientific research, in some national parks negative effects of sewage such as eutrophication of lakes, bad water quality, more faecal pollution near the trails and in streams were observed. In some national parks there are plans to modernize the sewage management by construction of treatment facilities, build or improve biological or mechanical

wastewater treatment plants and connect huts to the sewage system.

In the second group, which consisted of 16 national parks sewage was not a problem. In 8 of them toilets are located in the core zone. Sewage are managed by composting toilets and bags, biological wastewater treatment plants, draining over the ground, infiltrating of water in the ground and bio-compost containers, dry wells and disposed by a municipal company. In 8 national parks there are no toilets in the core zone and this is why it is convenient to use the sewage system. Only one park dispose sewage in sealed bags, which are transported using helicopter. Thanks to the proximity of the city, sewage is transported on short distances, up to 1 km. It is stored in biological wastewater treatment plants, discharge to the river, drain over the ground, infiltrate to the ground or septic tanks are used. One park is using dry wells, but no chemicals are added. Scientific researches regarding the influence of sewage on nature were not conducted. Only the biological water quality was monitored. In one case it was observed that the infiltration wells were not filtering properly because they were sealing. They were cleaned and chemicals used to restore sufficient filtering. Increasing eutrophication in the reservoir was also observed. The only planned investment regarding the sewage management is to use Biolan compost system.

Conclusions

Data collected from 27 national parks show that sewage is effectively managed through sewage systems. Other kind of sewage management are not efficient enough. The good practise is to build toilets and other facilities outside the protected areas. But this is an easy solution for parks with low number of visitors (like in Norway). Analysing the data from the received questionnaires, insufficient level of scientific research and observations of the impact of sewage on nature was noted.

Probably due to the SARS-CoV-2 we have received information from small number of national parks. Described problem is very complex and because of growing pressure of tourism on nature the research on this matter should be continued and extended to more national parks.

References

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