

Introduction

Thanks to snow, we can grow delicious rice and enjoy winter sports. Snow is one of the most popular attractions of Uonuma. However, because of snow, people in the Uonuma region have unpleasant feelings in winter. Uonuma has the heaviest snow in Japan every year. Snow causes many problems such as snow shoveling, land subsidence, and the difficulty of walking on the road. These problems bother citizens in winter. We suggest using special asphalt to solve these problems in this region. If we could apply it for snow removal, snow would disappear from the road and problems with snow will be solved. Our idea will achieve two goals: to make sustainable cities and communities, and to take concrete measures against climate change. These goals are included in Sustainable Development Goals (SDGs), as suggested by United Nations Development Decade.

Problems

We focused on two problems which are caused by snow. These are land subsidence and snow accumulation. The use of a large amount of groundwater leads to land subsidence. We need to use groundwater to remove snow, but we can't overuse groundwater to avoid land subsidence. If we don't use it, people would have great difficulty removing snow by themselves. Hence, they have to depend on local companies' snow shoveling. Although the necessity for these local companies is still high, the number of association for shoveling snow is decreasing. Uonuma has large snowfall, so if we don't remove snow from the road, pedestrians won't be able to walk and cars won't be able to go through. In addition, pedestrians are squirted with snow by car so they feel unpleasant because of it. Removing the snow from the road is indeed a big problem for people living in the region.

Solutions

In order to deal with both land subsidence and snow accumulation, we should remove snow from the road without using groundwater. To achieve it, we suggest to apply drain asphalt to the road in order to remove snow. Drain asphalt is different from common asphalt in terms of its structure. Usually, the size of rock forming asphalt is so small that water cannot pass through it. However, large rocks can be used for the first layer of draining asphalt, so water can penetrate between rocks. A second layer of the asphalt isn't waterproof. This means water is emitted from the second layer. This structure will reduce the amount of snow accumulation on the road and problems previously mentioned will be solved.

Our idea does not only help in removing snow, but also makes use of emitted water

effectively. We propose that we reuse emitted water for agricultural water in summer. We based it on water temperature. Global warming has bad impacts on the growth of delicious rice. According to the agricultural research institute, quality of rice will drop if temperature would increase by 3 °C. (<http://www.naro.affrc.go.jp/archive/niaes/>) High temperature causes white-immature rice. If the rate of it becomes large, the quality of rice would drop. We cope with the problem by storing it in an insulating tank so that we can use cold water in summer. Our idea enables us to remove snow from the road ,to take measures against increasing water temperature , and to save rice's quality.

Conclusion

In conclusion, we deal with Uonuma's snow problems by using drain asphalt. It doesn't need ground water, so land subsidence will be suppressed, will enable citizens to live comfortably in winter, and will use snow effectively. We reuse melted water for rice cultivation. Our idea will enable us to make a sustainable city, to take action against climate change, and to solve problems caused by snow.

(633words)