

Nature Conservation and Invasive Plant Removal Activities in Tateyama, Japan

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Abstract

Tateyama is a preserved natural area featuring several types of vegetation from 1,000 to 3,000 m above sea level. The development of tourism in the 20th century had strong impacts on its natural environment. Greening was necessary to stabilize land that had been left bare by road construction. A unique method of greening was adopted, using local plant resources. However, roadway construction resulted not only in disturbance to the vegetation but also unintentional introduction of invasive plants. A movement to remove the invasive plants was organized in 1980 with several volunteer groups continuing these efforts to this day. Such activities have been based on local values. Global standards for nature conservation have been established recently, but local values may also work efficiently in sustainable promotion and should be evaluated.

Key words: alien plant species, global standard, greening, invasive plant removal, local plant resources, local values, sustainable movement, volunteer group

1. Introduction

In the spread of alien plants, roads have been suggested to function significantly as corridors (Meunier & Lavoie, 2012). Mountain trails also play a role as drivers of non-native plant invasion (Liedtke *et al.*, 2020). Honshu, the largest island of the Japanese archipelago, is located mainly in the temperate zone, with alpine areas separated from each other like small islands. Therefore, any alien plant derived from abroad or from lower domestic regions can become invasive here. Tateyama is located within Chubusangaku National Park, in central Japan. It consists of mountains that reach altitudes of around 3,000 m on the ridgelines with a lava plateau beneath. For tourism and hiking, bus roads and mountain trails are provided along the plateau. Oritani (1976) investigated alien plants along the roadside and reported the presence of alien species derived from abroad. In 2014, the Toyama Prefecture Biodiversity Conservation Promotion Plan (Toyama Prefecture, 2014) was published and it reported that alien plant species were invading the vegetation of Tateyama, explaining the necessity of removing them. The plan also reported that the invasive plants had been continuously removed by volunteers. The objectives of this paper are to follow the history of human

impacts and the conservation movement on Tateyama to examine a philosophy of nature and biodiversity conservation derived not only from the global values but also based on local respect for nature.

2. Background

Human beings have been continuously visiting Mt. Tateyama for more than 1,000 years. Pilgrimages to climb Mt. Tateyama are estimated to have begun in the 10th century (Yonehara, 2010). Tateyama also appeared in literature. In the 8th century, Tateyama was admired by verses in the *Man'yōshū*, an anthology of ancient poetry. In about the 12th century, Tateyama became well known through the tales of the *Konjaku Monogatari* with its volcanic valley as a gateway to Hell. In the medieval ages, a Noh Play named *Utoh* denoted Tateyama as a harsh mountainous terrain. An interesting line in this story is where a pilgrim says there are “a lot of trails” on Tateyama, and they are “frightening and steep.” This implies that there was already some degree of human impact at that time.

In the 17th century, pilgrimages to the Tateyama mountains became popular among common people. One can see a hut built in 1726 for the visitors’

accommodation.

Despite such human involvement during all this time, the unique landscape of Tateyama features fragile vegetation that has been well preserved. This is probably because the landscape of Tateyama was itself worshiped as a sacred place (Hirose, 1984).

However, from the beginning of the 20th century, the relationship between Tateyama and people changed. Freed from religious restrictions and introduced to modern mountaineering, people began climbing Tateyama as a sport or expedition (Tateyama Museum of Toyama, 2008). Improved transportation access accelerated the popularization of climbing. More and more people began to visit Tateyama as an educational activity for school children (Tateyama Museum of Toyama, 2005). As the number of climbers increased, the total length of the mountain trails doubled (Ohmiya & Kobayashi, 2019). Overuse of these trails caused erosion of the soil and vegetation everywhere.

In 1953, the construction of a bus road started in the lowest end of the plateau, Bijodaira (977 m), and the next year, the Tateyama Cable Car began service between Senjugahara (475 m) and Bijodaira followed by the Highland Bus service, with the roadway extending gradually to the Murodo terminal (2,450 m). In 1971, the entire route was completed with a tunnel running through Mt. Tateyama, below the 3,015 m peak of Oyama. People could then visit the alpine zone simply by riding the bus.

These days, the most important issue in nature conservation on Tateyama is considered to be countermeasures against looting of alpine plants. The Forestry Office has taken the lead in raising awareness of nature conservation and preventing the plundering of alpine plants (Yonezawa, 2023).

The roadway construction disturbed the natural environment of Tateyama on a larger scale than ever experienced. At the same time, the opening of the bus road reduced the use of mountain trails for visitors' access along the roadway. Some trails were abolished after the bus road opened. Estimating from maps, the total length of the mountain trails in the Tateyama area reached a maximum of 74.3 km in 1971 just when the Tateyama Alpine Route opened, and they have decreased to a current total length of 32.0 km.

3. Recognition of Alien Plant Invasions and Local Movements against the Spread of Alien Plant Species

The roadway construction left some of the ground cut and filled. The bare land needed to be revegetated. At that time, it was common to use alien species for greening, even in protected areas such as sub-alpine areas (Yamadera *et al.*, 1976). During the construction of the Tateyama route, the focus of nature protection gradually changed. A nature conservation movement spread

throughout Japan with a special emphasis on opposing development in nature conservation areas. In Toyama Prefecture, the Association for Nature Conservation of Toyama was established in 1962. This association lodged several requests and objections to the development. With expanded development becoming controversial in 1965, supplementary articles for approval by the nation were announced. These were mainly concerned with greening methods. The Ministry of Health and Welfare approved the construction of the Tateyama route with the condition that "the greening method should be based on local plant resources" (Wakabayashi, 1974).

To meet the conditions imposed, the Tateyama Route Greening Research Committee was organized to fulfill the Ministry's demand, including by developing new techniques. The committee examined 60 species growing spontaneously in places on Tateyama to seek proper materials for greening (Kobayashi, 1974, 1980; Oritani, 1974, 1980).

In 1971, the year the Environment Agency was established, the Tateyama Mountain Range Nature Conservation Society was established, with a membership consisting mainly of researchers such as Shoichi Kawano, students and general citizens. The society still operates under the Tateyama Nature Conservation Network. Public opinion was becoming important for administering nature conservation.

Despite the policy of not using non-native species, an accident occurred in which alien seeds wound up mixed in with the greening materials. Izumi (1976) recognized that alien plants were being found in the Murodo area. Kawano (1977) pointed out that several alien plants were being used for greening along the roadway. The Tateyama Route Greening Research Committee has been engaged in removal of introduced alien plants since 1980 (Wakabayashi, *et al.*, 1997).

Unexpected introduction of non-native plants was also thought to be the result of vehicles carrying them in, and of being brought in on visitors' shoes, which set them directly into the alpine zone from lower areas. Alien plants were rapidly expanding their distribution, so fundamental countermeasures became necessary. The Tateyama Mountain Range Nature Conservation Society (presently the NPO Tateyama Association for Nature Conservation) has repeatedly researched alien plants along the Tateyama Route since 1997 (Masuda, 2004). The Toyama Forest Management Office has added the removal of alien species to its alpine plant protection patrol activities since 1998 (Yonezawa, 2023).

In the latter half of the 1990s, activities to remove alien plants became popular among various groups and volunteers (Fig. 1). In 2004, removal activities by four groups were recorded, increasing to 17 groups in 2014. As interest in alien species increased, information on target species and appropriate removal methods became important. Matsuhisa (2004) enumerated sixteen species



Fig. 1 Left: The Tateyama Association for Nature Conservation has continued invasive plant removal activities (photo courtesy of Terutaka Kato). Right: A representative alien species *Taraxacum officinale* on the roadside at Midagahara, Tateyama (22 May 2008).

from abroad and fifteen species from lower regions as alien plants on Tateyama. Nagai (2006) discussed the background of the alien plant invasion of Tateyama, Oritani (2006) discussed soil factors for alien plant introduction, Ohta (2006) suggested a priority for alien plant species removal and Matsuhisa (2006) explained the removal methods in detail.

In 2008, at the behest of the prefectural government, these academics and related organizations launched a study group on measures for removing alien plants from Tateyama. A report was submitted that recognized forty species as non-native and invasive to Tateyama areas (Ohta *et al.*, 2011). In addition, from this study group, the Toyama Prefecture Naturalist Association, which consists of nature commentators certified by the prefecture, has started training instructors for the removal of invasive plants by volunteers and others.

In parallel with these activities, the Tateyama Vegetation Research Society has been conducting fixed-point observations of invasive plants as part of the Tateyama Vegetation Monitoring Survey commissioned by the prefecture. Yamashita and Ohta (2018) reported the interim results of that monitoring survey.

The current issues are enhancing measures to share information on the status of alien plants among organizations and groups engaged in alien species removal and information on removal activities and their results, and disseminating information beyond the prefecture. Progress is being made through loose consensus and cooperation.

4. Discussion

In 1992, the Japanese government signed the Convention on Biological Diversity (CBD) and adopted its National Biodiversity Strategy and Action Plan in 1995. The Toyama Prefecture Biodiversity Conservation

Promotion Plan (Toyama Prefecture, 2014) could be considered a local version. In the convention and the action plans, three levels of biodiversity were defined: specific, ecological and genetic. Before discussions on the CBD began, the latter two levels of biodiversity were ignored, and plans for greening or vegetation reconstruction usually depended on alien resources selected for their vigorous growth, even in nature conservation areas (Yamadera *et al.*, 1976). The Ministry authorized a unique method of conducting greening trials on Tateyama while avoiding alien species for materials. Some involvement by local demand is surmised, but this is not certain. Conserving landscapes and relying only on locally grown plant resources were probably considered rational by the local people upholding traditional values. This consideration in 1965 effectively prevented the introduction of non-native genes, resulting in the conservation of genetic diversity described in modern terms. This was fortunate for Tateyama, because that policy reduced the future cost of invasive plant removal.

Although the global standard for nature conservation has developed remarkably, we must not forget that local activities originating from local values have been sustaining real natural environments, ecosystems, species and their genetic background. The author believes that activities for sustainable conservation of local natural environments should be based essentially on self-awareness. Activities on Tateyama are relevant and advanced.

At the same time, local movements should cooperate with the global standard as well.

5. Conclusions

These days, almost all groups engaging in the removal of invasive plants in the Tateyama region meet together annually to discuss problems they have

discovered when taking their actions. Together with scientific and technical issues they have uncovered, funding problems are always presented. Public funds are always limited, so these groups are usually covering expenses with their own money. Recent global movements may provide several types of funds as investment in Nature Positive, Carbon Neutral and other challenges in environment conservation. A little modification in disclosure would be required when attempting to raise funds. That would also improve their actions and lead to the next stage of the movement. Those engaging in activities on Tateyama should participate in the global discussion with confidence in their experience in nature conservation.

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