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Knight, J. (2017). Wildlife tourism as crop protection? double-goal provisioning and the transvaluation of the macaque in postwar Japan. *Human-Wildlife Interactions*, 11(2), 217-230. [12]. <https://doi.org/10.26077/vef7-2v90>

Published in:
Human-Wildlife Interactions

Document Version:
Publisher's PDF, also known as Version of record

Queen's University Belfast - Research Portal:
[Link to publication record in Queen's University Belfast Research Portal](#)

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Commentary

Wildlife tourism as crop protection? Double-goal provisioning and the transvaluation of the macaque in postwar Japan

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Abstract. Human–wildlife interfaces are often sites of friction and conflict in the form of crop and livestock depredations that can lead to negative local attitudes toward the animals responsible. This paper examines the use of provisioning to reduce wildlife damage through diversion (diversionary feeding) and to display the diverted animals for tourism. It focuses on a macaque (*Macaca fuscata*) provisioning initiative from the municipality of Ōita in western Japan that set out to achieve these 2 objectives of crop protection and tourism. Provisioning succeeded in establishing the macaques as a popular tourist attraction, but it has been far less effective in keeping farmland safe from crop-raiding. Owing mainly to macaque population increase and habituation, the early diversion effect waned and crop-raiding re-emerged as a problem. The Ōita vision of double-goal provisioning has proven to be flawed and the compatibility of diversionary provisioning with wildlife tourism highly questionable.

Key words: crop-raiding, diversionary feeding, Japan, *Macaca fuscata*, macaque monkey, provisioning, transvaluation, wildlife tourism

HUMAN–WILDLIFE INTERFACES are often marked by friction and conflict (Knight 2000, Conover 2002, Woodroffe et al. 2005). Crop-raiding, livestock losses, and other forms of harm to human livelihoods by wildlife can lead to negative local attitudes toward and intolerance of the animals responsible. A wide range of measures, lethal and non-lethal, are taken to protect crops and livestock from wildlife damage. The focus of this paper is on diversionary provisioning (often referred to as diversionary feeding), a non-lethal response in which food is used to lure problem wildlife away from the site to be protected. Diversionary provisioning is directed at a variety of crop pests, including wild boar (*Sus scrofa*; Calenge et al. 2004), elephants (*Elephas maximus sumatrensis*; Nyhus et al. 2000), and assorted primates (Southwick et al. 1976, Baker and Schutt 2005, Kaplan et al. 2011), but extends to wild predators that threaten livestock, game animals, and human safety (Table 1).

The diversion of harmful wildlife is just 1 form that provisioning (human feeding of wildlife) takes. For the purposes of this paper, 3 broad categories of provisioning are distinguished

according to purpose: dietary support (food), observation, and then diversion itself (Table 1). The first category is where provisioning supplements the diet of wild animals that would otherwise be faced with food scarcity and is usually associated with game management (Putman and Staines 2004) or wildlife conservation (Gilbert et al. 2007) where it serves to boost or maintain animal numbers.

The second category, provisioning for observation, includes feeding wildlife to expedite field research, especially in primatology (Charles-Dominique 1977, Rijksen 1978, Goodall 1986). It also includes feeding wild animals to establish them as tourist attractions (Orams 1995, Walpole 2001, Hodgson et al. 2004), with primates again featuring prominently (Fa 1991, Zhao and Deng 1992, Wheatley 1999). This kind of provisioning strategically moves the animals to sites where they can be viewed clearly and (especially in the case of tourism) visited easily.

By contrast, the third category of provisioning, diversionary provisioning, is a defensive measure directed at potentially harmful animals. There is an important underlying similarity with the second category: like provisioning for

Table 1. Selected reported applications of provisioning in the published literature by broad category.

Species	Country	Food ¹			Observation ²			Diversion ³			Reference
		Game mgmt.	Conservation	Touristic display	Scientific observation	Crop protection	Livestock protection	Game protection	Human safety		
Black bear (<i>Ursus americana</i>)	United States					Yes				Ziegltrum 1994	
Brown bear (<i>Ursus arctos</i>)	Slovenia						Yes			Kavcic et al. 2013	
Condor (<i>Gymnogyps californianus</i>)	United States		Yes							Wilbur et al. 1974	
Capuchin (<i>Cebus capucinus</i>)	Costa Rica					Yes				Baker and Schutt 2005	
Chimpanzee (<i>Pan troglodytes</i>)	Tanzania				Yes					Goodall 1986	
Crane (<i>Grus grus</i>)	Sweden	Yes								Nilsson et al. 2016	
Dolphin (<i>Tursiops truncatus</i>)	Australia			Yes						Orams 1995	
Elephant (<i>Elephas maximus sumatrensis</i>)	Indonesia (Sumatra)							Yes		Nyhus et al. 2000	
Golden lion tamarin (<i>L. chrysomelas</i>)	Brazil		Yes							Castro et al. 1998	
Grizzly bear (<i>Ursus arctos horribilis</i>)	Canada								Yes	Quinn and Broberg 2007	
Hen harrier (<i>Circus cyaneus</i>)	United Kingdom								Yes	Thirgood and Redpath 2005	
Hyena (<i>Crocuta crocuta</i>)	Ethiopia			Yes						Baynes-Rock 2012	
Iguana (<i>Cyclura cyclura</i>)	Bahamas			Yes					Yes	Hines 2011	
Komodo dragon (<i>Varanus komodoensis</i>)	Indonesia			Yes						Walpole 2001	
Macaque (Barbary) (<i>M. sylvanus</i>)	Gibraltar			Yes						Fa 1991	
Macaque (long-tailed) (<i>M. fascicularis</i>)	Indonesia			Yes						Wheatley 1999	

Table 1 continued on next page...

Table 1 continued.

Macaque (Japanese) (<i>M. fuscata</i>)	Japan	Yes	Yes	Yes	Yes	Knight 2011
Macaque (Rhesus) (<i>M. mulatta</i>)	India	Yes	Yes	Yes	Yes	Southwick et al. 1976
Macaque (Tibetan) (<i>M. tibetana</i>)	China	Yes				Zhao and Deng 1992
Mule deer (<i>Odocoileus hemionus</i>)	United States				Yes	Wood and Wolfe 1988
Orangutan (<i>Pongo abelii</i>)	Indonesia		Yes			Rijksen 1978
Polar bear (<i>Ursus maritimus</i>)	Alaska				Yes	Defenders of Wildlife 2012
Red deer (<i>Cervus elaphus</i>)	Europe/ North America		Yes			Putman and Staines 2004
Reef shark (<i>Carcharhinus perezi</i>)	Bahamas	Yes				Maljković and Côté 2011
Sparrowhawk (<i>Accipiter nisus</i>)	Ireland				Yes	Lloyd 1976
Stingray (<i>Dasyatis brevicaudata</i>)	Australia	Yes				Lewis and Newsome 2003
Tiger (<i>Panthera tigris tigris</i>)	Nepal	Yes				McDougal 1980
Vulture (<i>Gyps bengalensis</i>)	Pakistan		Yes			Gilbert et al. 2007
Wallaby (<i>Petrogale mareeba</i>)	Australia	Yes				Hodgson et al. 2004
Whale shark (<i>Rhincodon typus</i>)	Philippines	Yes				Ziegler et al. 2016
Wolf (<i>Canis lupus</i>)	United States/ Alaska				Yes	Gasaway et al. 1992

¹"Food" refers to the provision of food to support the diet of wild animals that would otherwise be faced with food scarcity.

²"Observation" refers to provisioning to make wild animals observable.

³"Diversions" refers to provisioning used to lure wild animals away from sites where they should not feed or where they are a threat to human safety.

⁴"Game protection" refers to the protection of game animals from the predation pressure associated with the animal in question.

⁵"Human safety" refers to animal attacks on humans and to animal-caused traffic collisions.

observation, provisioning for diversion is an act of food-assisted relocation in which the human food supply is used to affect the movement or whereabouts of the animal in question. However, the relation between movement and place is very different in the 2 cases. Observational provisioning is a positive relocation in which the emphasis is on connecting animal to place (the site of observation), while diversionary provisioning is a negative relocation in which the emphasis is on separating animal from place (the site to be protected). If provisioning for observation is essentially a move-to relocation, diversionary provisioning is a move-from relocation.

These 2 kinds of human relocation of animals can also correspond to 2 forms of animal revaluation. Provisioning for touristic observation, by making it possible to view animals that might otherwise be difficult to locate or that are prone to conceal themselves, confers on them a positive resource value as a tourist attraction. For its part, diversionary provisioning, by separating animals from the places where they cause harm, promises to neutralize their negative value as pests. There appears to be a clear contrast between these 2 forms of human-sponsored, food-induced relocation (and corresponding revaluation) of wildlife.

This paper examines an example of wildlife provisioning that seems to defy such a contrast. Macaque provisioning in Ōita in western Japan was undertaken to divert crop-raiding macaques from farmland as well as to display the macaques in an open-range visitor attraction. Comprising both move-from and move-to emphases, this hybrid form of provisioning poses a challenge to our understanding of relocationary provisioning as a form of wildlife management. But on account of the way it combines wildlife tourism and crop protection objectives, the Ōita example also has implications for our understanding of the relationship between tourism and human–wildlife conflict and, more specifically, of the potential of wildlife tourism to change the livelihood value of animals.

This paper is written by a social anthropologist with a research interest in wildlife tourism and its transformative effects on the animals involved (Knight 2009). Tourism as an industry

is known for its ability to change the value of things and places. Kirshenblatt-Gimblett (1995) refers to this effect when she describes heritage as a value-added industry and as a form of "transvaluation." Things that were unimportant, worthless, or obsolete can become valuable in the context of tourism, and local people in tourist areas may well revalue the objects, buildings, and landscape around them in response. Although Kirshenblatt-Gimblett's (1995) discussion is concerned with cultural heritage, the concept of touristic transvaluation can be applied more widely, including to the animals that feature in wildlife tourism.

This becomes apparent when wildlife tourism is invoked as a potential solution to human–wildlife conflict. The kind of reasoning in support of this claim is as follows. Wildlife tourism "promises benefits to offset the costs of living with wildlife, thereby providing incentives to tolerate and conserve wildlife" (Walpole and Thouless 2005, 135). As the phrase "offset the costs" suggests, wildlife continues to have harmful effects, but these effects are now outweighed by the gains from wildlife tourism, and the animal becomes the source of a net benefit (Ashley and Roe 1998). Such offsetting is the normal form that the touristic transvaluation of problem wildlife takes.

Drawing on the example of macaque provisioning at Ōita, this paper explores the possibility that the touristic transvaluation of wildlife can take another form: that tourism can tackle—not just offset—the costs of living with wildlife. This would amount to a duplex form of transvaluation where the value of wildlife changes in 2 ways rather than 1 way: by ending the negative effect of animals on human livelihoods and by creating in its place a positive animal effect on human livelihoods through tourism. The combination of diversionary provisioning with wildlife tourism would seem to be ideally placed to resolve—not just mitigate—human–wildlife conflict. But how does such double-goal provisioning work out in practice? The Ōita example can help provide an answer.

Study area

The Japanese archipelago is home to the Japanese macaque (*Macaca fuscata*). Commonly known as *nihonzaru*, or the Japanese monkey,



Figure 1. The location of monkey parks in postwar Japan. The Takasakiyama Natural Zoo (36), located in Oita on the northeastern part of the island of Kyushu, opened in 1953 (this map originally appeared in Knight 2011).

the macaque raids crops in most parts of its range. The problem of monkey damage (*engai*) affects thousands of hectares of farmland and causes more than a billion yen’s worth (or around \$9 million) of crop losses each year. In response, villagers try to obstruct macaque access to village farmland through fencing, field-guarding, and assorted scare tactics (Inoue 2002, Muroyama 2003, Chōjū Higai Taisaku Kiban Shien Iinkai [CHTKSI] 2014). Culling is also carried out, accounting for 13,145 macaques in 2013 (Environment

Agency n.d. 2013).

Another much rarer response to monkey damage has been the use of diversionsary provisioning combined with tourism. This involves using food handouts to lure macaques away from farmland to a separate place where they are displayed to tourists. This divert-and-display strategy was first used against crop-raiding macaques in a municipality in western Japan, resulting in the establishment an open-range attraction called Takasakiyama Natural Zoo (Figure 1).

Takasakiyama is a coastal mountain that rises on the rural outskirts of the city of Ōita. Located on the northeastern part of the island of Kyushu, Ōita has a humid, sub-tropical climate with oak-laurel forest vegetation consisting of glossy broad-leafed trees (such as *Camellia japonica*, *Castanopsis cuspidate*, and *Quercus* spp.). The Takasakiyama mountain forest has long been home to a troop of Japanese macaques, which was made famous by the pioneering field study carried out on the mountain in the early 1950s by the primatologist Itani Junichirō (Itani 1971).

Takasakiyama had already undergone considerable change by the time Itani started his field research there. The mountain forest had been extensively logged, while farming operations had been established on the lower foothills of the mountain. Macaque crop-raiding emerged as a problem in the late 1940s, one that Itani soon learned about from affected farmers in the course of his fieldwork (Itani 1971). The farmers chased away macaques spotted in their fields, but the crop loss continued. With the delisting of the macaque as a game animal in 1947, farmers were unable to reduce macaque pressure on their crops through hunting. In these circumstances, farmers demanded that the local government cull the macaques and even called for their eradication (Ōita Gōdō Shinbun 1951).

Ueda Tamotsu, mayor of Ōita at the time, resisted demands for macaque eradication and instead proposed that the animals be turned into a tourist attraction. His plan was to use daily food handouts to lure the macaques down the mountain to a clearing where they could easily be viewed—an idea known as *saruyose*, or monkey-luring. The mayor reasoned that attracting macaques to the park with food during the day would divert them from the farmers' fields and protect crops (the diurnal macaque would not threaten crops at night). As Ueda's biographer points out, the mayor believed that his monkey-luring plan would "kill two birds with one stone" (the Japanese expression is *isseki nichō*) by simultaneously creating a tourist attraction and solving the macaque pest problem (Nakagawa 2003).

Results

The mayor's plan for monkey-luring at Takasakiyama promised benefits to both

tourism and farming. With respect to tourism, the mayor's initiative proved a remarkable success (Nakagawa 2003). Provisioning soon established control over the movements of the macaques, and within a few months the monkey troop was appearing in the park area on a daily basis. On March 15, 1953, the Takasakiyama Natural Zoo opened to the public and advertised itself as a place where open-range wild monkeys could be viewed directly. The wild status of the macaques was based on their continued association with the forest. They travelled from the forest to the park each morning and then made the reverse journey back to the forest at the end of the afternoon.

In contrast to the conventional zoo, where animals and zoogoers are clearly separated, visitors to the unpartitioned park were able to experience an extraordinary proximity to the macaques and could even feed them themselves. The appeal of the park among the Japanese public soon became obvious. More than 500,000 people visited in its first year, and this annual figure steadily increased, so that, in its tenth year, Takasakiyama Natural Zoo attracted almost 1.5 million visitors, while the total number of visitors for this first decade of operation reached 10 million (Takasakiyama 2003). The mayor's monkey-luring initiative had created one of the most popular visitor attractions in postwar Japan.

The success of Takasakiyama led to the creation of macaque parks across the country in the years that followed. By the end of the 1950s, 19 parks had opened, and altogether >40 parks would be established (Figure 1). The Takasakiyama park became "an unrivalled visitor attraction which has given birth to many imitators across the country, and was entirely due to the mayor's vigorous determination to bring it about" (Andō 1981, 305). The mayor's initiative did not just create a tourist attraction at Takasakiyama, but led to the emergence of a whole tourism sector consisting of "wild monkey parks" (*yaen kōen*). Mayor Ueda's status as a pioneer in tourism was later recognized when a Distinguished Service Award was bestowed on him by the Japan Tourist Association (Tamoto 1990).

The mayor's plan appears far less prescient when it comes to the crop protection claim.

Macaque crop-raiding continues to be a serious problem in settlements at the foot of Takasakiyama. A variety of valuable fruits are commercially grown by residents, including loquats (*Eriobotrya japonica*), figs (*Ficus erecta*), and satsumas (*Citrus unshiu*), and these fruits, along with a range of vegetables, are prime food targets for the macaques. Figures on crop loss are not available, but the compensation paid to local residents by the park for damage caused by macaques gives an indication of the size of the problem. According to the most recent figures, for 2016, ¥9.33 million (around \$80,000 U.S.) was paid out in compensation (Ōita Gōdō Shinbun 2017). In the past, compensation payments have been much higher: in 2004 the figure was >¥30 million (around \$290,000 U.S.).

Discussion

For the social anthropologist, the mayor's idea of offering food to crop-raiding animals has a ring of familiarity about it. In his magnum opus, *The Golden Bough*, James Frazer provided examples of the custom of reacting to food-raiding animals by feeding them. Referring to "the Saxons of Transylvania," he wrote that to keep sparrows from the corn, the sower should throw the first handfuls of seed backwards over his head, saying "That is for you, sparrows" (Frazer 1996, 636). By sharing a portion of the crop with it, the farmer attempts to placate the animal so that it is no longer minded to raid the rest of the crop, in what amounts to a form of appeasement feeding. In this way, the farmer protects the harvest by giving up a small part of it. However, despite this resemblance, it is clear enough that the mayor wanted to divert the macaques rather than appease them. His idea would therefore be more accurately characterized as an instance of diversionsary provisioning.

Like the appeasement feeding described by Frazer (1996), diversionsary provisioning involves a part-for-whole strategic substitution whereby a portion of food is given up to secure the crop overall. Both are examples of food-giving for the purpose of food-saving: that is, motivated food-transfer in which a little is given away to save a lot and/or low-value food is given away to protect higher-value food. But the 2 things are understood in very different

ways. Appeasement works with the animal, while diversion instead works on the animal. The mayor's food handouts to macaques were intended, in the first instance, to be an act of control over macaques and their movements rather than part of a reciprocal relationship with the macaques.

Diversionsary provisioning or feeding is "one of the most philosophically appealing approaches to resolving a human-wildlife conflict because the animal voluntarily changes its behavior when offered a more attractive alternative" (Conover 2002, 271). This alternative animal behavior is selected for its incompatibility with the harmful or undesirable animal behavior, so that animal adoption of the former effectively extinguishes the latter. If a regular pattern of animal feeding can be established in place X, the animals will not be in a position to feed in place Y (assuming that there is an appropriate distance between these 2 places). Diversionsary feeding can therefore be seen as an example of the incompatible behavior approach to behavior suppression that is popular in behavior management and animal training circles (Peterson and Tenenbaum 1986, Miltenberger 2008). A key principle of this form of behavioral modification is that it is often easier to get animals "to do something else than to stop them from doing something" (Sutherland 2008, 132).

Two ways of supplying diversionsary food to crop-raiding animals can be distinguished (Conover 2002). The first involves the use of special fields, known variously as lure fields, diversionsary fields, and sacrificial fields, with which to attract animals away from the fields to be protected (Conover 2002). The second form of diversionsary food supply involves the use of a feeding station or bait station. This is a site to which food handouts are brought (as opposed to fields or plantations where they are grown) which then serves to attract the target animals and, in the process, divert them from farmland or some other vulnerable space.

The form of diversionsary provisioning championed by Mayor Ueda had an extra dimension to it. The macaques were to be diverted to a feeding station that would double up as a park where tourists could watch the assembled macaques. The mayor's

monkey-luring initiative therefore combined diversionary and observation-directed forms of provisioning. This articulation with tourism can make a major difference to the way diversionary provisioning works. To show this, we first need to examine more closely the utilitarian calculation on which diversionary provisioning was based.

Value differential

Diversionary provisioning depends on the existence of a clear value differential between feed and crop—that is, between the “sacrifice” food given away and the target crop to be protected (Conover 2002). As a rule of thumb, the latter should be “several times more valuable than the former” (Conover 2002, 281). The greater this gap in value, the better the return from the diversion. Conversely, the smaller this gap in value (or perceived gap), the less beneficial the diversion appears and the more open it is to criticism.

Doubts about the feed–crop value differential informed the negative local reaction that the mayor’s monkey-luring plan initially met with. To many people at the time, the difference in value between field crops and food handouts at Takasakiyama was highly questionable. The mayor first decided to use apples (*Malus* spp.) as feed, but when he realized that the macaques had little interest in apples, he switched to sweet potatoes (*Ipomoea batatas*), as these were something that he knew, from farmer complaints, the macaques had a taste for (Ueda 1958). Critics ridiculed the idea of giving macaques human food to stop crop-raiding (Andō 1981). The obvious objection was that, if the crops in the field were too valuable to be eaten by macaques, it was hardly less wasteful for boxes of apples or sweet potatoes to be given to them. In the Japan of the early 1950s, such concerns about food waste were reinforced by recent memories of acute wartime and postwar food scarcity.

Provisioning is always potentially open to this kind of food waste criticism insofar as the lure food in question has a value on the human side. The exception would be where food of little or no human value is used. An example of this is the regular bear feeding at garbage dumps in American national parks where the animals were viewed by park visitors (O’Brien

1948, Schullery 2004, Biel 2006). Although the bears feed on human foods, there is no food cost to the human side because the food in the garbage dump is no longer deemed edible to humans (it has, so to speak, become ex-food). This is perhaps the closest approximation to what we might call no-cost provisioning.

By contrast, the initial reaction to the mayor’s provisioning proposal was to see the food given out to the macaques as food lost to people. This zero-sum reaction is illustrated by the complaint of a critic made directly to the mayor: “What are we to make of a situation where, even though you won’t feed apples to our children, you are using public money to feed [apples to] monkeys?” (in Nakagawa 2003, 131–132). To some citizens of Ōita, the mayor’s monkey-luring plan was an example of costly provisioning that, far from safeguarding food, itself represented further food loss to macaques.

The mayor responded to this objection in 2 ways. First, he denied that the food handouts in the park really were human food that was equivalent in value to the crops in the field. Ueda stated that the food handouts dispensed to the macaques were inferior to food produce commercially sold (UTTKI 1981). In other words, his critics were wrong because the feed–crop value differential was sound; low-value food handouts would divert macaques from, and so protect, high-value crops. The use of sweet potatoes as feed would have made this diversion argument more credible, given the sweet potato’s lowly status as a cheap food item eaten only when rice (*Oryza sativa*) was unavailable (Duell 1991).

The mayor did not limit himself to this response. He also represented the food handouts as bait for catching something more valuable. This is suggested by the use of a fishing metaphor, according to which macaque provisioning was depicted as “fishing with bait” (*esa de tsuru*). Similar to angling where bait is used to catch fish, feeding macaques should be thought of not as losing food but as catching macaques and, by extension, gaining tourism. Mayor Ueda argued that, with the setting up of the park, the macaques would become a source of income for the city in the form of the revenue from visitors ready to pay to see them. This point was made

in an interview with a former worker at the Takasakiyama park when I asked him about how the mayor dealt with the criticisms of his plan: “[T]he response of the mayor at the time was to say, ‘we will tax the monkeys’... As the revenue from the admission charge kept on increasing, he was [later] able to say that ‘we now have a huge income which the monkeys have earned for us’” (T. Matsui, Takasakiyama park employee, personal communication, August 12, 2008). Far from being beggars or food-dependents living off citizens’ taxes, the macaques are portrayed here as tax-payers or net wealth producers benefitting Ōita and its citizens.

Mayor Ueda attributed a positive, wealth-generating value to the act of provisioning. Strictly speaking, the wild macaque troop is not, in itself, a usable touristic resource on account of the macaques’ tendency to minimize or avoid contact with humans and conceal themselves in the forest. Only through the staging effect of provisioning in a clearing does the macaque troop become observable to the public and therefore exploitable for tourism. It is therefore the combination of macaques and food that creates the attraction and lays the foundation for the “wild monkey park.” For Ueda, regular food handouts were the crucial lever of control over the macaques that enabled their display on a consistent basis. While early critics saw provisioning as a wasteful act that depleted the stock of valuable human food, the mayor saw this same transfer of food to macaques as a productive act that created a valuable tourist attraction.

Duplex transvaluation

One view of the benefit of macaque tourism at Takasakiyama might be that it offsets the farmers’ crop loss (provided that at least some of the benefit from tourism reaches them). Crop-raiding would continue, but redirected revenue from tourism would alleviate its impact on the lives of the farmers. The macaque would no longer appear to local people as just a pest; it would also be seen as a resource. This would be the interpretation of the Takasakiyama episode from the perspective of what we might call simple or uniplex transvaluation. Provisioning changes the value of the macaque in 1 domain but not

the other: the macaque is accorded a positive livelihood value with respect to tourism, but continues to have a negative livelihood value with respect to farming.

However, the mayor made the much more ambitious claim that provisioning would do 2 things, not 1 thing (i.e., “kill two birds with one stone”). Monkey-luring would, through the double impact of provisioning, establish tourism as well as stop crop damage. In addition to luring the macaque troop to the park, provisioning would separate the macaques from the farmland they were raiding. Regular food handouts in the park would allow the macaque to make a positive contribution to human livelihoods through tourism, while at the same time ending its negative impact on farming. In short, it would be an example of duplex transvaluation: a 2-fold transformation of the macaque’s livelihood value.

This double return is potentially of great significance because, in theory, it addresses the problem of the benefits from macaque tourism not getting to the people suffering from macaque crop damage. This, of course, is a main criticism of the claim that wildlife tourism can promote local support for conservation. If those bearing the costs of wildlife crop-raiding see none of the benefits from wildlife tourism themselves, they will be much less likely to recognize animals as beneficial and instead continue to view them as pests. But if wildlife crop-raiders can be flipped into tourist attractions (i.e., rendered attractions in a way that ensures they cease to be crop-raiders), then farmers cannot but benefit, for the animals will no longer cause crop loss. Therefore, in principle, the farmers at the foot of Takasakiyama stood to benefit from monkey-luring twiceover: indirectly from the revenue raised from the municipally run tourist attraction that would boost the coffers of Ōita City Hall, and also directly from crop protection.

Duplex transvaluation and hunting

The focus of this paper is on an example of double-goal provisioning aimed at creating a wildlife tourism attraction and at protecting crops. But this is not the only form that duplex transvaluation can take. A similar “two birds with one stone” claim can be made for

hunting that involves problem animals. There are many examples of crop-raiding animals that are hunted for meat, including bush pigs (*Potamochoerus larvatus*) in Uganda (Naughton-Treves 1998), elephants (*Loxodonta africana*) in Zimbabwe (Lamarque et al. 2009), and primates in Sumatra (Marchal and Hill 2009). The double return from this kind of hunting is the resource (meat) it generates and the animal control it effects (reducing the harm that would otherwise be caused by the animals). Similarly, a double benefit is sometimes claimed for recreational hunting (Fraser 2000, Taylor 1994, Loveridge et al. 2009). In these cases, this lethal intervention may serve as—or at least appear to serve as—pest control insofar as, for every animal hunted, there is 1 fewer animal about to raid crops.

Compared with hunting, the pest control potential of wildlife tourism can appear rather weak. Unlike consumptive hunting, non-consumptive tourism does not reduce animal numbers; hunted animals are killed, but viewed animals are still alive and in circulation and therefore free to cause harm. However, the macaque tourism envisaged by Mayor Ueda did have a control function of sorts: control over the location or day-time whereabouts of the macaques, thanks to the pull of the food handouts. As he saw it, provisioning would divert the macaques from a place where they cause damage to another place where they bring benefits. Macaques feeding in the park would not be feeding on farmland. If this was control, it was spatial rather than population control.

Provisioning's failure to reduce crop-raiding

There are a number of reasons why provisioning has not put an end to monkey damage. First, provisioning resulted in a reduction in the monkey troop range. The sites of macaque damage in the past ceased to be within the troop's new range, and therefore macaque visitation was reduced. As the troop re-centered its range closer to the park, settlements near the park that experienced mild crop damage in the past became much more vulnerable. In this way, provisioning redistributed rather than ended crop-raiding (see Itani 1975).

Second, provisioning affected population size. Following the opening of the park, the macaque population increased sharply from 220 macaques in 1953 to 1,713 macaques by 1975. This was in large part due to provisioning's effect on macaque fertility, but also to park managers deliberately trying to boost macaque numbers—setting the park with the goal of having a thousand monkeys, or *senpikizaru*—in the belief that it would enhance the park as a visitor attraction. But macaque population growth resulted in the repeated fissioning of the oversized troop, which led to a worsening of the crop-raiding situation. As ≥ 2 troops cannot be present in the park at the same time, the absent troop(s) sometimes drifted near to settlements in search of food.

Lastly, provisioning may have promoted crop-raiding because of habituation. Normally, habituation is not a goal or outcome of diversionary provisioning. Where the food is placed and left in a feeding site, or even more so where a lure field is grown, the animals that come to feed have little if any direct human contact. But the situation is likely to be very different where diversionary provisioning is combined with tourism at the lure site.

The provisioned macaques of Takasakiyama were in daily contact with the park staff who fed, monitored, and even at times interacted playfully with them. They also encountered hundreds of park visitors each day. Today's visitors just watch the macaques, but in the past they were allowed to hand-feed them, which often involved aggressive macaque begging. One macaque behavior that developed was the bluff threat in which the macaque would lunge at the food-holding visitor, startling the latter into dropping the food, which the macaque then collected from the ground. Park macaques learned from this experience that people can easily be frightened, something which can embolden them when encountering villagers in and around farmland near the park.

Because it took decades for some of these effects to become apparent, doubts regarding the mayor's claims that the diversionary provisioning was successful were slow to emerge. In this regard, the tenacity of diversionary thinking should be recognized.

This was something illustrated in the park sector more generally where persistent crop damage by park macaques was interpreted as evidence that the animals must still be hungry and that they had not been sufficiently provisioned, prompting an increase in food handouts, especially to macaques on the fringe of the troop (Mito and Watanabe 1999). While these responses may have relieved the immediate pressure on farmland, longer term this intensification of provisioning is likely to have exacerbated crop-raiding by park macaques.

With the benefit of hindsight, Mayor Ueda's faith in the power of food-assisted diversion to tackle crop-raiding now seems clearly misplaced. Few, if any, would propose such a response to today's ubiquitous monkey damage problem. But this does not mean that the diversion argument has completely disappeared from the monkey park sector. It tends, however, to take the following form: in reaction to local criticisms and even demands from park-edge villagers for it to close down, a park may well argue (with some justification) that, by feeding the macaques on a daily basis, it generally keeps them away from park-edge fields, and that, were it to close and the daily provisioning operation cease, the macaques would likely react to the disappearance of their normal food supply in the park by moving *en masse* to park-edge farmland, which would become their default feeding ground. Given the size of the provisioned macaque population of the park, this warning is taken very seriously by park-edge farmers (Knight 2011).

Management implications

More than 6 decades on from the founding of Takasakiyama Natural Zoo, Mayor Ueda's promise that provisioning would create a harmonious relationship between humans and macaques has not been realized. Although provisioned macaques do come to the park on a daily basis and have become a valuable tourist attraction, what has developed is something rather different from his divert-and-display vision. The mayor's attempted transformation of the human-macaque relationship through a kind of utilitarian engineering of macaque feeding behavior has not worked, at least as

a form of duplex transvaluation. Instead of converting a pest into a resource, provisioning at Takasakiyama has created a macaque population that straddles park and field, thrilling the tourist but angering the farmer. At most, what develops is a *de facto* offsetting situation in which the macaques' beneficial presence in the park as a visitor attraction compensates for, but does not solve, the harm they cause beyond it.

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