A Comparative Study on Biodiversity Offsets in Airport Development Projects

Keisuke GOTO*, Asahi ABE*, Yuki INOUE*, Akira TANAKA**

Abstract

Tanaka and Ohtaguro (2010) showed that 53 countries had already institutionalized biodiversity offsets. This paper investigated the proposed biodiversity offset strategies in airport expansion projects and provided suggestions for countries that are about to undertake biodiversity offsets. In the Sunshine Coast Airport expansion project, it became clear that the offset area was larger than the impacted area when both off-site and on-site offset sites were secured. With the Heathrow Airport expansion project, it was demonstrated that by considering three risks while calculating the biodiversity gains, the offset provider improved the implementation of biodiversity offset, making it more effective. In the Juneau International Airport expansion project, consultation with various agencies ensured the ecological reliability of the value paid to in-lieu fee programs. The results suggest that the use of mitigation banks can contribute to effective biodiversity offsetting.

Key Words: Biodiversity Offset, Mitigation Bank, Airport Expansion Project

1. Introduction

There has been an international trend towards incorporating biodiversity considerations in project investment decision making, such as ESG investment. Biodiversity offset is a strategy to compensate for the loss of biodiversity resulting from economic development projects. Tanaka and Ohtaguro (2010) showed that 53 countries had already institutionalized biodiversity offsets. However, their implementation methods and criteria vary from country to country.

In April 2018, the expansion project of Tokyo Narita International Airport embarked on biodiversity offsetting. Therefore, it is expected that the practice of biodiversity offsets will increase substantially in Japan.

This study aims to contribute to the discourse on the biodiversity offsets in countries currently considering biodiversity offset implementation, including Japan, through comparative case studies from three countries: the United States, United Kingdom, and Australia.

2. Methods

We selected and surveyed important matters associated with biodiversity offsetting and quantitative evaluation methods in three expansion projects: Sunshine Coast Airport, Heathrow Airport, and Juneau International Airport.

3. Results

3.1 Sunshine Coast Airport (SCA)

3.1.1 Project Overview

In 2014, Environmental Impact Statement (EIS) was published on the construction proposal of a new 2,450 m long and 45 m wide runway and aviation at SCA.

This project was chosen as a survey subject since a large site had been reserved for biodiversity offsetting.

3.1.2 The extents of the impact and offset sites

Table 1 shows that 80.23 ha of the 203.98 ha project area was completely cleared of vegetation. In contrast, Table 2 shows that the offset sites secured consisted of 83.66 ha on-site and 63.15 ha off-site offsets, for a total area of 146.81 ha. The airport was required to offset the impacts to habitats for two species of interest under the Commonwealth requirements and five species of interest under the Queensland requirements. Tables 3 and 4 compare the areas of impacted habitat for each species to the areas of the proposed offsets. For each species, the offset area was greater than or equal to the impacted area.

* Graduate School of Environmental and Information Studies Tokyo City University
** School of Environmental Studies Tokyo City University

Table1 The extent of the project area

Site	Area (ha)
Vegetation community cleared by the project	80.23
Vegetation community Transition to Dwarf Heathland	9.90
Already cleared for some time	113.85
	203.98

Modified from source: SCA and Sunshine Coast Council (SCC) (2015)

Table2 The extent of the offset site

Site	Area (ha)
On-site	83.66
Off-site	63.15
	146.81

Modified from source: SCA (2015)

Table3 The impact and offset area for each species of interest under Commonwealth requirements.

Scientific Name	Common Name	Impact (ha)	Offset (ha)
Allocasuarina emuina	Mount Emu She-oak	4.41	4.41
Litoria olongburensis	Walllum Sedgefrog	1.67	12.23
		6.08	16.64

Modified from source: SCA (2015)

Table4 The impact and offset area for each species of interest under Queensland requirements.

Scientific Name	Common Name	Impact (ha)	Offset (ha)
Allocasuarina emuina	Mount Emu She-oak	4.41	10.42
Litoria olongburensis	Walllum Sedgefrog	1.67	66.37
Crinia tinnula	Wallum Froglet	60.63	92.73
Litoria freycineti	Wallum Rocketfrog	21.85	76.01
Pezoporus wallicus	Ground Parrot	7.88	35.71
		96.44	281.24

Excerpted from: SCA (2015)

3.2 Heathrow Airport (HA)

3.2.1 Project Overview

HA is located approximately 27 km west of central London. In 2019, the Environmental Information Report (EIR) was published on the construction proposal of a new 3,500 m long runway and aviation facilities.

This project was chosen as a survey subject since HA is the representative airline hub of the UK and is located near the city center.

3.2.2 Three risks to consider when calculating biodiversity gain

The following formula was used to calculate biodiversity gain:

Final biodiversity gain = crude biodiversity gain / (delivery risk × temporal risk × spatial risk).

This formula is based on the idea of habitat quality × area introduced by Habitat Evaluation Procedure (HEP) that appeared in the early years as an ecological quantitative evaluation procedure in the U.S. (Tanaka, 2016).

In the HA project, the offset provider could plan a more effective biodiversity offset by taking these three risks into account.

a) Delivery Risk

This risk is associated with the actual delivery of the offset due to, for instance, uncertainty in the effectiveness of restoration or habitat creation/management techniques (Natural England and DEFRA, 2012). Tables 5 and 6 show the delivery risk multipliers considered for the project. For each habitat type impacted by the project, multipliers were set according to the difficulty of habitat creation and restoration.

b) Temporal Risk

This risk stems from the potential time lag between the negative impacts on biodiversity and the offsets reaching the required quality or level of maturity (Natural England and DEFRA, 2012). Tables 7 and 8 show the temporal risk multipliers used for the HA project. Multipliers were set with a 3.5% discount rate, in accordance with the number of years estimated for each habitat recreated or restored at the offset site to reach the target habitat quality considered in the calculation of biodiversity gain.

Table5 Delivery risk multipliers

Difficulty of habitat creation/restoration	Multiplier
Very high	10.0
High	3.0
Medium	1.5
Low	1.0

Excerpted from: Heathrow Airport Limited (HAL) (2019)

Table6 Delivery risk factors for creation and restoring habitats

Habitat type	Difficulty of creation	Difficulty of restoration
Semi-natural broadleaved woodland (incl. lowland mixed deciduous woodland)	Medium	Low
Wet woodland (excluding willow carr)	Medium	Low
Willow carr	Low	Low
Dense native scrub	Low	Low

Excerpted from: HAL (2019)

Table7 Temporal risk multipliers

Years to target condition	Multiplier
5	1.2
10	1.4
15	1.7
20	2.0
25	2.4
30	2.8
32+	3.0

Excerpted from: HAL (2019)

Table8 Temporal risk factor

Habitat type	Years to target condition
Semi-natural broadleaved woodland (incl. lowland mixed deciduous woodland)	32+
Wet woodland (excluding willow carr)	32+
Willow carr	10
Dense native scrub	5

Excerpted from: HAL (2019)

c) Spatial Risk

This risk reflects ecological risks deriving from the change in location of the habitat or resource (Natural England and DEFRA, 2012). Table 9 shows the spatial risk multipliers considered for the HA project. For this project, if an offset is implemented at a location consistent with the purpose of a higher plan, it is recognized that the location is ecologically appropriate, and the multiplier does not apply. However, if the offset is not implemented at such a location, the multiplier value increases with increasing distance from HA to the administrative division where the offset site is located.

3.3 Juneau International Airport (JNU)

3.3.1 Project Overview

In 2007, the Final EIS was published on the proposed project to expand the runway safety area and construct aviation facilities JNU.

In this project, the in-lieu fee program was used as a biodiversity offset. Fees were paid to Southeast Alaska Land (SEAL) Trust, which is authorized to accept in-lieu fees for mitigation projects. This project was chosen as a survey subject since the airport is located adjacent to an important habitat.

3.3.2 The cost paid to the in-lieu fee program

Property transactions within accreted wetlands in three areas contiguous to the refuge were identified and evaluated by Horan & Company of Sitka. JNU initially offered $2,185,200 to the in-lieu fee program. However, at an Alaska Coastal Management Program (ACMP) meeting attended by the representatives of JNU and

Table9 Spatial risk multiplier

Offset location	Rationale	Multiplier
Offset provided within the limits of 1. The River Colne and Crane Area (Area 10) of the All London Green Grid (ALGG); 2. The Colne Management Catchment when south of the M4 (motorway); 3. The Crane Rivers and Lakes Operational Catchment.	The habitats created/restored will contribute to the objectives of ・the All London Green Grid strategy ・Colne Valley Biodiversity Opportunity Area ・Colne Valley Gravel Pits and Reservoirs Biodiversity Opportunity Area ・London Biodiversity Action Plan	1
Offsets provided within the following local planning authority areas but outside the above area (e.g., London Borough of Hillingdon, South Buckinghamshire, Spelthorne, Slough).	The habitats will contribute to the objectives of a variety of Biodiversity Opportunity Areas and landscape scale biodiversity improvement.	2
Offsets provided in areas outside above areas but within the following wider county boundaries; Berkshire, Surrey, Buckinghamshire, and Greater London.	The habitats will provide linkages within the wider landscape and will provide landscape scale biodiversity management linked to the areas closer to Heathrow.	3
Offset provided in any other area of England.	The habitats will not contribute to local objectives.	4

Modified from source: HAL (2019)

various agencies such as the Federal Aviation Administration (FAA), Environmental Protection Agency (EPA), National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), Department of Natural Resources (DNR), and Alaska Department of Fish and Game (ADF&G), the payment was agreed to $4,370,400, twice the amount offered. Finally, a total of $5,559,636, including the other costs, was paid.

The City and Borough of Juneau, Alaska (CBJ) and FAA (2007) explained that the original suggestion of baseline value would have been insufficient for fully compensating the losses for three primary reasons. First, a 1:1 compensation ratio results in a net loss of wetlands. Second, the wetlands to be lost are of high value. Third, there is a precedent where a large project affecting high-value wetlands and habitats was asked to compensate in greater proportion than small projects. Thus, consultation with various agencies ensured the ecological reliability of the in-lieu fees paid in place of implementing biodiversity offsets.

4. Conclusions and Discussion

In the SCA expansion project, the combined offset area was much greater than the impacted area by securing both off-site and on-site offset sites. In the HA expansion project, the offset provider improved the effectiveness of biodiversity offsets by taking three specific risks into account in biodiversity gain calculations. In the JNU expansion project, consultation with various agencies ensured the ecological reliability of the biodiversity offset strategy. These cases each imply a distinct and effective strategy for project proponents to take into consideration when planning biodiversity offsets.

However, there is an unresolved problem that it is very inefficient for individual project proponents to look for suitable offset sites and implement habitat restoration and creation for every new project (Tanaka, 1994). Therefore, in this study, we propose a biodiversity offset strategy using a mitigation bank that enables effective biodiversity offsetting while also reducing the proponents' burden in consultation with various agencies. With mitigation banking, a proponent is required only to pay a certain fee to a mitigation banker.

It is possible to secure a substantial off-site offset site. Furthermore, it eliminates the delivery risk and temporal risk because habitat has already been created in mitigation banks. Spatial risk can also be avoided if the mitigation bank is located according to the local higher plan and is considered ecologically appropriate.

We discovered that planning biodiversity offset strategies by consulting with associated various agencies can ensure ecological compliance. It was also confirmed that each airport intended to achieve No Net Loss through planning effective biodiversity offset strategies.

With an increasing trend of biodiversity-conscious investment, it is expected that the strategies found in this study will provide useful insights for entities considering biodiversity offsetting.

References

Alaska Department of Natural Resources (2007) Alaska Division of Lands Notices, memos Attachment B Mitigation Plan Juneau International Airport Large Project.

City and Borough of Juneau, Alaska (CBJ) and Federal Aviation Administration (FAA) (2007) Juneau International Airport Final EIS and Section 4(f)Evaluation PART I: Chapters 1-3 and Executive Summary.

Heathrow Airport Limited (HAL) (2019) Heathrow Expansion Preliminary Environmental Information Report Volume 3, Chapter 8: Biodiversity.

Natural England and Department for Environment Food and Rural Affairs (DEFRA) (2012) Biodiversity Offsetting Pilots Technical Paper: the metric for the biodiversity offsetting pilot in England.

Sunshine Coast Airport (SCA) (2015) Sunshine Coast Airport Expansion Project Biodiversity Offsets Strategy.

Sunshine Coast Airport (SCA) and Sunshine Coast Council (SCC) (2015) EIS – Volume B: Airport and Surrounds Chapter B7 Terrestrial Flora.

Tanaka, Akira (1994) Implication of Environmental Impact Assessment and Mitigation, as tools for Conservation of regional ecosystems. People and Environment, No. 20, pp. 32-36.

Tanaka, Akira (2016) Theory and Practices for Habitat Evaluation Procedure (HEP) in Japan. Asakura Publishing Co., Ltd., Tokyo, 266pp.

Tanaka, Akira and Ohtaguro, Shinsuke (2010) Biodiversity offsets that enable strategic ecological restorations –Current situation of institutionalizing biodiversity offset in various countries and its implications to Japan. City Planning Review, Vol. 59, No. 5, pp. 18-25.