



OPEN ACCESS

REVIEW

Environmental Conservation Strategies in City of Joondalup Coastal and Foreshore Management Plan 2014 – 2024

Received:
12-06-2022

Accepted:
10-07-2022

Published:
15-07-2022

Priya Khangotra

School of Science, Edith Cowan University, Western Australia, Australia.

Correspondence and requests for materials should be addressed to PK (email: khangotra97priya@gmail.com)

Abstract

The main objective of the City of Joondalup Coastal Foreshore Management Plan between 2014 and 2024 is to conserve, ameliorate the natural belongings of the city, and protracted conservancy of the environment and ecological significance for forthcoming generations by applying or generate, integrate, interpret and action of different environmental management mechanisms which include monitoring and reporting, education and information, voluntarism, command and control. This paper reveals the environmental conservation strategies under this plan.

Keywords: Environment; Conservation; Joondalup; Management; Plan

Introduction

Biological diversity is a vital part of environment's valuable assets that endow several human necessities as well as ensure in opposition to environmental calamities (Heydari et al., 2020). But the human activities have changed the environment thus, the man has created acts and statutes such as constitutional duties, state plans, national and state legislations, general and legal enactment resources for either mitigate the destruction done or preserving the diversity for the following generation (Mushtaq et al., 2020). The reason for environmental management plans requirement is the City of Joondalup ('the City') that deals with several management problems related to the coastal foreshore reserve (Figure 1).

The City of Joondalup Coastal Foreshore Management Plan objectives

The main objective of the City of Joondalup Coastal Foreshore Management Plan between 2014 and 2024 is to conserve, ameliorate the natural belongings of the city, and protracted conservancy of the environment and ecological significance for forthcoming generations by applying or generate, integrate, interpret and action of different environmental management mechanisms which include monitoring and reporting, education and information, voluntarism, command and control. The City Biodiversity Plan from 2009 to 2019 endows direction and details for the City's biological diversity management best practices as well as the advancement of individual Natural Area Management Plans (Figure 2).

Biological Diversity Conservation

To maintain and conserve the biodiversity values, the Coastal foreshore reserve helps the diverse range of flora and fauna species by which in results, the community has advantage which includes number of ecological facilities, for instance, captured carbon dioxide, cool atmosphere of the city and several experiences related to recreation and culture. In the review of Natural Areas Management Plan, many mechanisms and characteristics recommended for current management (Ecoscape, 2002). According to Principle 17, Environmental impact assessment considered as a 'national instrument', introduced for proposed projects that have a considerable environmental impact and dependent to a national authority decision in The Rio Declaration on Environment and Development (Keating, 1992).

Flora and Fauna Conservation; and Management Mechanisms

From the North Shark Bay to the South Israelite Bay, comprising the Joondalup Foreshore



Reserve, the South – West of Western Australia is one biological diversity hotspot out of 34 throughout the world which involved above 2,900 endemic flora species (Scott et al., 2009). Due to large extent of habitats, the South – West of Western Australia has a great diversification of plants and animals found in dense geographical region as well as deal with significant risks (Myers et al., 2000) (Table 1). Whereas, about 30% natural vegetation proportion of this region remained by the loss of habitat predominantly (Conservation International, 2012). Therefore, there would be greater chances of risk in the upcoming years without active management of conservation as the existing projects or possible management practices in hotspots has kept the naturalistic values at endangered (Government of Western Australia, 2007).



Fig. 1. Site location and boundary, Coastal Foreshore Reserve. Natural Area Consulting (2014) Coastal Foreshore Management Plan, 2014 – 24. City of Joondalup

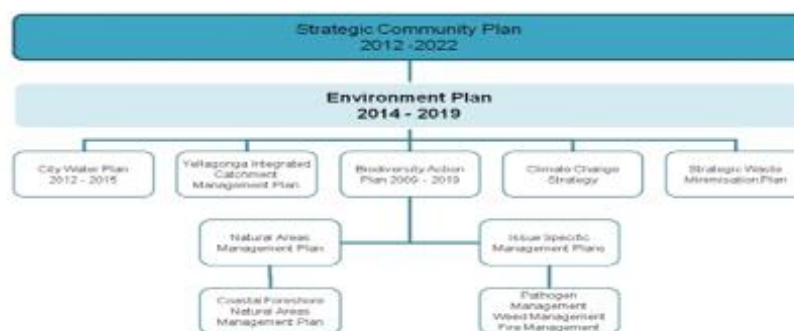


Fig. 2. Strategically Environmental Structure. Natural Area Consulting (2014) Coastal Foreshore Management Plan, 2014 – 24. City of Joondalup

A few numbers of prominent plant species have been found in the coastal foreshore reserve in which one of the species (*Marianthus paralius*) recognized as to be 'threatened', on the contrary, one species (*Hibbertia spicata* subsp. *leptotheca*) considered in 'priority 3' in the Wildlife Conservation Act 1950, Western Australia (Table 2 and 3). The species (*Marianthus paralius*) has not been recorded in the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act, 1999). The surveys for this plant species conducted and the first taxon collected during 'A Floristic Survey of the southern Swan Coastal Plain' (Gibson et al., 1994), then have been undertaken in 2004 to analyze the conservation status of taxon by DEC staff (Maguire et al., 2004), hence, the new population determined by City of Joondalup staff during the survey in the year 2005.

Table 1. Flora and Fauna Diversity of South – West of Western Australia. Myers et al. (2000) Biodiversity hotspots for conservation priorities. Biodiversity Report – City of Joondalup, 2008.

TAXONOMIC GROUP	SPECIES	ENDEMIC SPECIES
Plants	5,571	2,948
Mammals	59	12
Birds	285	10
Reptiles	177	27
Amphibians	32	22

The declared plant and animal species considered as a risk for the environment that should be managed and prevented for the agriculture conservation under the Agriculture and Related Resources Protection Act 1976. One-leaf Cape Tulip (*Moraea flaccida*) declared plant has been discovered in the coastal foreshore reserve (Department of Agriculture and Food, 2013). However, a number of pathogens examined that infected the plants. *Armillaria* (*Armillaria luteobubalina*), one of the plant diseases, infected the healthy plants when contacted with them (Smith et al., 2003), but has not been found in the coastal foreshore reserve, whereas *Phytophthora cinnamomi* considered as a threat to the vegetation of Joondalup that invades approximately 25% of plant species identified in the Southwest Botanical region (Natural Area Consulting, 2014).



Fig. 3. Significant Plant Species in the Coastal Foreshore Reserve. Natural Area Consulting (2014) Coastal Foreshore Management Plan, 2014 – 24. City of Joondalup.

Due to habitat loss, man-made activities and non-native predators' existence, several fauna species have been undertaken environmental threat. A two-level survey conducted at Ocean Reef Marina site in which the existence of 4 frog species, 45 reptiles, 89 birds, and 24 mammals recorded in the year 2008 (Western Wildlife, 2008), and Graceful Sun Moth (*Synemon gratiosa*), considered as an endangered species and recorded at State as well as Commonwealth levels in 2009 (SMEC, 2009), similarly, the survey conducted again with the same outcomes in 2011 (Natural Area Consulting, 2011).

Table 2. Significant Plant Species in the Coastal Foreshore Reserve. Department of Environment and Conservation (2011), FloraBase. (2012). City of Joondalup – Coastal Foreshore Management Plan, 2014 – 2024.

SPECIES	DESCRIPTION	FLOWERS	SOIL ASSOCIATION	RATING
<i>Marianthus paralius</i>	Prostrate, woody shrub, climbs as it ages	Red, September – November	White sand atop limestone and on low coastal rocks	Threatened
<i>Hibbertia spicata</i> <i>subspecies leptotheca</i>	Erect or dispersed shrub 0.2 – 0.5 m	Yellow, July – October	Sand nearby coastal limestone ridges, outcrops and rocks	Priority 3

Both the native flora and fauna affected and resulted in extinction by the non- native fauna species (DSEWPac, 2012) such as birds, foxes, millipedes, bees resided in the coastal regions, City's bushland and wetlands by certain factors including competition for food and shelter, predation, dispersing diseases and dissipating habitats. However, Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) distributed in human cultivation and urban land utilization areas (Richards et al., 2020), reported as a critically endangered species in Western Australian and Australian Conservation Legislation, and under the IUCN Red List (IUCN, 2019) (Table 3).

Table 3. Significant animal species possibly occur at the Proposed Ocean Reef Marina Development Site. Western Wildlife (2008), Natural Area Consulting (2013) City of Joondalup – Coastal Foreshore Management Plan, 2014 – 2024.

SCIENTIFIC NAME	COMMON NAME	CONSERVATION STATUS	LISTING
<i>Synemon gratiosa</i>	Graceful Sun Moth	P4	State
<i>Calyptorhynchus latirostris</i>	Carnaby's Black Cockatoo	Critically endangered	State Commonwealth

Biodiversity Management Mechanisms

Biodiversity, including flora and fauna species ameliorated and conserved from environmental threats by using various environmental management mechanisms. Using rehabilitation activities improve and maintain the flora and vegetation, for instance, in bush forever, the natural regeneration of plants occurred readily evaluated by the usage of vegetation condition rating scale (Government of Western Australia, 2000). The best management practices for flora and vegetation comprises steady evaluation and detection of plants at a particular frequency and the usage of local habitat seed and cuttings for restoration. The Pathogen Management Plan involves the education and communication development mechanisms to increase awareness of plant diseases in the city and society. On the contrary, several management actions have been applied to detect native animal species such as fauna surveys and address the environmental effects of local and pest fauna in the naturalistic regions. Ecological linkages also help to maintain flora and fauna diversity (Table 4).

The public awareness through numerous projects, for instance, Waterwise Garden Project, and co-partnership with various stakeholders including State Government agencies, Local

Governments, Schools and Universities, Friends and Environment Groups considered as one of the environmental management mechanisms (Biodiversity Action Plan, 2009 – 19). Under the Rio Declaration on Environment and Development, section 4.40., the provincial communities and resource appropriators received the data and skills required to manage their surroundings and resources from the invocation on the administrations (Keating, 1992).

Table 4. Biodiversity Management Mechanisms (Generation, Integration, Interpretation and Action).

BIOLOGICAL DIVERSITY CONSERVATION AREA	MANAGEMENT ACTIONS
Flora	Rehabilitation activities, A seed collection program, Steady flora evaluation, Weed control activities, Ecological linkages.
Plant Diseases	Plant diseases awareness among community through a Pathogen Management Plan.
Fauna	Conduct and repeat detailed fauna surveys like every five years to examine the strategies effectiveness, Public awareness through projects, Engagement with stakeholders.

Table 5. Abbreviations

TERM	DEFINITIONS
the City	City of Joondalup
CALM	Conservation and Land Management
DEC	Department of Environment and Conservation
DSEWPac	Department of Sustainability, Environment, Water Population and Communities
EIA	Environmental Impact Assessment
EPBC	Environment Protection and Biodiversity Conservation Act
IUCN	International Union for Conservation of Nature
SMEC	Snowy Mountains Engineering Corporation
WALGA	Western Australian Local Government Association

References

Biodiversity Action Plan (2009a) City of Joondalup. http://www.joondalup.wa.gov.au/Libraries/Documents/Biodiversity_Action_Plan_20092019.pdf

Biodiversity Action Plan, 2009 – 19. City of Joondalup. <https://www.cbd.int/doc/nbsap/sbsap/au-sbsap-joondalup-en.pdf>

Categories of Threatened Species (2012) Department of Sustainability, Environment, Water, Population and Communities. <http://www.environment.gov.au/biodiversity/threatened/species.html>

Conservation International (2012) Southwest Australia. http://www.conservation.org/where/priority_areas/hotspots/asiapacific/SouthwestAustralia/Pages/default.aspx

Department of Environment and Conservation (2009) *Marianthus paralius* Interim Recovery Plan, 2009-2014. Interim Recovery Plan No. 291. Department of Environment and Conservation, Western Australia. https://www.dpaw.wa.gov.au/images/documents/plantsanimals/threatenedspecies/recovery_plans/Approved_interim_recovery_plans_/marianthus_paralius_.pdf

Ecoscape (Australia) Pty Ltd (2002) Joondalup Coastal Foreshore Natural Areas Management Plan. City of Joondalup.

<https://www.joondalup.wa.gov.au/files/councilmeetings/2014/Attach14brf130514.pdf>

FloraBase (2011) Department of Environment and Conservation. <http://florabase.dec.wa.gov.au/>

FloraBase (2012) The Western Australian Flora. <http://florabase.dec.wa.gov.au/search/advanced>

Gibson N, Keighery BJ, Keighery GJ, et al. (1994) A floristic survey of the Southern Swan Coastal Plain. Unpublished report for the Australian Heritage Commission prepared by the Department of Conservation and Land Management and the Conservation Council of Western Australia (Inc.). <https://library.dbca.wa.gov.au/static/FullTextFiles/001217.pdf>

Government of Western Australia (2000) Bush Forever, Volume 2 – Directory of Bush Forever Sites. Department of Environmental Protection, Perth, Western Australia. <https://www.wa.gov.au/system/files/2021-07/POL-Bush-Forever-Volume-2-Dec2000.pdf>

Government of Western Australia (2007) State of the Environment Report. Environmental Protection Authority, Western Australia. <https://www.epa.wa.gov.au/state-environment-report-2007>.

Heydari M, Omidipour R and Greenlee J (2020). Biodiversity, a review of the concept, measurement, opportunities, and challenges. Journal of Wildlife and Biodiversity. <http://dx.doi.org/10.22120/jwb.2020.123209.1124>

IUCN (2019) The IUCN Red List of Threatened Species. Version 2019.2. <http://www.iucnredlist.org>

Keating M (1992) The Rio Declaration on Environment and Development. https://www.iau-hesd.net/sites/default/files/documents/rio_e.pdf

Local Planning Strategy (2009b) City of Joondalup. http://www.joondalup.wa.gov.au/Welcome/citynews/090910/DRAFT_LOCAL_PLANNING_STRATEGY.aspx

Maguire J and Sage L (2004) Threatened Flora Survey Report Spring 2004. Conservation status of *Marianthus paralius* [=Billardiera sp. Seabird (G.J. Keighery)]. Department of Conservation and Land Management. https://www.dpaw.wa.gov.au/images/documents/plants-animals/threatenedspecies/recovery_plans/Approved_interim_recovery_plans_/marianthus_paralius_.pdf

Mushtaq B, Bandh SA and Shafi S (2020) Environmental Acts and Legislation. In: Environmental Management (pp. 149 – 184). Springer, Singapore. https://doi.org/10.1007/978-981-15-3813-1_4

Myers N, Mittermeier RA, Mittermeier CG, et al. (2000) Biodiversity hotspots for conservation priorities. Nature 403:853-858. <https://www.nature.com/articles/35002501>

Natural Area Consulting (2011) Graceful Sun Moth Survey – Proposed Ocean Reef Marina Development Site. City of Joondalup. <https://www.joondalup.wa.gov.au/files/councilmeetings/2014/Attach14brf130514.pdf>

Natural Area Consulting (2014) Coastal Foreshore Management Plan, 2014 – 24. City of Joondalup. <https://www.joondalup.wa.gov.au/files/councilmeetings/2014/Attach14brf130514.pdf>

Pickard MT (2008) Biodiversity Report, 2008. City of Joondalup. https://cbc.iclei.org/wp-content/uploads/2016/09/Joondalup_BR_final.pdf

Richards B, Sullivan M and Mawson PR (2020) A case study of environmental offsets for the endangered Carnaby's cockatoo (*Calyptorhynchus latirostris*). *Pacific Conservation Biology* 26:269–281. <https://doi.org/10.1071/PC19038>

Scott PM, Burgess TI, Barber PA, et al. (2009). *Phytophthora multivora* sp. Nov., a New Species Recovered from Declining Eucalyptus, Banksia, Agonis and Other Plant Species in Western Australia. *Persoonia* 22:1 – 13. <https://dx.doi.org/10.3767%2F003158509X415450>

SMEC (2009) Graceful Sun Moth Survey 2009 Ocean Reef Marina. City of Joondalup. <https://www.joondalup.wa.gov.au/files/councilmeetings/2014/Attach14brf130514.pdf>

Smith IW and Smith DI (2003) Forest Fact Sheet – Armillaria Root Rot: A Disease of Native and Introduced Trees, Forest Science Centre. Department of Sustainability and Environment, Victoria. http://www.dse.vic.gov.au/data/assets/pdf_file/0013/102145/Armillaria_Root_Rot.pdf

Western Wildlife (2008) Ocean Reef Marina Redevelopment: Level 1 Fauna Assessment 2008. SMEC, Australia. <https://www.joondalup.wa.gov.au/files/councilmeetings/2014/Coastal%20Foreshore%20141014.pdf>

Western Australian Organism List (2013) Department of Agriculture and Food. <http://www.biosecurity.wa.gov.au/western-australian-organism-listwaol>.

Author Contributions

PK conceived the concept, wrote and approved the manuscript.

Acknowledgements

Not applicable.

Funding

There is no funding source for the present study.

Availability of data and materials

Not applicable.

Competing interest

The author declares no competing interests.

Ethics approval

Not applicable.



Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution, and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third-party material in this article are included in the article's Creative Commons license unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. Visit for more details <http://creativecommons.org/licenses/by/4.0/>.

Citation: Khangotra P (2022) Environmental Conservation Strategies in City of Joondalup Coastal and Foreshore Management Plan 2014 – 2024. *Environ Sci Arch* 1(2):46-52.