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| Title | Data packages for the Biodiversity Impacts and Adaptation Project |

Abstract


The Biodiversity Impacts and Adaptation Project (BIAP) forecasts broad impacts of climate change on biodiversity and identifies adaptation opportunities that can minimise biodiversity loss in NSW.

BIAP reinforces growing impetus in the community to acknowledge and to address the risks climate change poses to environmental sustainability and quality of life.

BIAP evaluates 12 NARCliM V1.0 modelled climate futures in terms of biodiversity persistence. It supports adaptation strategies by quantifying the relative benefits to biodiversity of prospective conservation and revegetation actions across the state.

BIAP builds on OEH's well-developed approaches to biodiversity evaluation, adding the 12 NARCliM V1.0 climate futures to the six 3C futures already completed (part of the Australian Government's Regional Natural Resource Management Planning for Climate Change, Stream 2). It also extends modelling of the impacts of climate change on biodiversity from 2050 up to 2070.


## Resource locator

Data Quality Statement

Name: Data Quality Statement

Protocol: WWW:DOWNLOAD-1.0-http--download

Description:

Data quality statement for Data packages for the Biodiversity Impacts and Adaptation Project

Function: download

Biodiversity Impacts and Adaptation Project (stage II) Report

Name: Biodiversity Impacts and Adaptation Project (stage II) Report

Protocol: WWW:DOWNLOAD-1.0-http--download

Description:

Report for the Biodiversity Impacts and Adaptation Project

Function: download

Bioclimatic Class Grids

Name: Bioclimatic Class Grids

Protocol: WWW:DOWNLOAD-1.0-http--download

Description:

# Bioclimatic class (BCC) GeoTiff grids for the 1990-2009 baseline, 2020-2039 and 2060-2079 NARCliM climate projections.

BIAP employed BCCs as biological surrogates. BCCs are coarse communities (or assemblages). They were derived from generalised dissimilarity models by using an unsupervised hierarchical clustering of biological data to define 250 BCCs. A nearest neighbour algorithm was used to assign each cell in the analysis region to a BCC. BCCs were represented spatially as both stacks of probability surfaces and as single surfaces where each cell was assigned the class of highest probability.

Initially the baseline GDM was used to develop a classification of 250 BCCs. To generate inputs for this classification, spatial environmental predictors (Table 1) were transformed by a set of coefficients that best fit environmental data to biological data. Transformed predictors were used to derive an ecological distance between pairs of sites by calculating the sum of absolute distances across all GDM dimensions. This 'GDM distance' functions as a compositional dissimilarity metric for the classification function.

To assess the spatial shift in BCCs over the 12 climate futures, the transformation coefficients derived from the 2000 baseline GDM were applied to the corresponding environmental predictors for all 12 climate futures at both 2030 and 2070 centred epochs. Transformed environmental predictors were then used to generate BCC classification grids.

For presentation in maps, using colour variation to represent the number of species shared between classes, the training data were run through a classical metric multi-dimensional scaling process to scale the dissimilarities among BCCs into a three dimensional space. After rescaling between zero and 255 these axes were used as RGB values for colouring the final classification grid.

This classification showed a good visual representation of compositional dissimilarity using BCC distributions. The dissimilarity between the individual classes is shown by their relative RGB colouring.

[Report section 2.3.1 - 2.3.2] [Report Appendix A]

Function: download

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| Future Compositional Dissimilarity Grids | Name: Future Compositional Dissimilarity Grids<br>Protocol: WWW:DOWNLOAD-1.0-http--download<br>Description:<br>Using the GDM transformed environmental predictors, a measure of environmental dissimilarity between 2000 and each climate future can be made at each location within the NARCliM domain. Calculating dissimilarity of a single location across epochs uses a similar approach to deriving ecological distance between any pair of sites in the same epoch; that is, by calculating the sum of absolute distances across all dimensions of the GDM space. Rather than calculating distances in transformed predictors between two spatially distinct sites, distances are calculated at a single site between transformed predictors for the baseline and climate future epochs.<br>The ecological distance between current and future transformed predictors provides an indication of how much a site is likely to change in terms of suitability for present species. While such comparisons do not consider a site’s capacity, or the spatial processes required to support new or existing ecosystems, it provides an indication of the direct impacts of climate change on the compositional aspect of biodiversity, such as whether sites will continue to be suitable for existing ecosystems or to what extent species composition is likely to change in response to changing environmental conditions.<br>Dissimilarity Grids in GeoTiff format have been calculated between the 1990-2009 Baseline and each 2020-2039 and 2060-2079 future NARCliM projection. Averages across climate scenarios have also been calculated for 2020-2039 and 2060-2079.<br>Values have been scaled from their initial range of 0-1 to 0-1000 then converted to integers. Potential grid values are from Zero (no dissimilarity) indicating no compositional change, through to 1000 (complete dissimilarity) where no species are expected to be shared between the baseline and future projection.<br>[Report section 2.3.4] [Report Appendix C]<br>Function: download |
| Combined 2000-2070 climate adaptation biodiversity benefits | Name: Combined 2000-2070 climate adaptation biodiversity benefits<br>Protocol: WWW:DOWNLOAD-1.0-http--download<br>Description:<br>Climate adaptation benefits provide guidance to conservation practitioners on how to align their actions to avoid or minimise climate-related biodiversity loss. However, to achieve this some long-held principles need to be challenged. We cannot rely on strategies that seek to reconstruct or hold on to species and ecosystems in the places they were once found but are less suited to under future climate. Change must be accepted as inevitable, but we can influence the nature of that change and thereby conserve values, albeit within a dynamic setting.<br>This three band (RGB) GeoTif raster layer illustrates overlap across three native vegetation benefits: *Conserve and manage good condition areas of important native vegetation into the future (red)* Restore and revegetate degraded areas that can support important native vegetation into the future (blue) *Connect habitats to help native species adapt to climate change (green)<br>Collectively, these benefits combine the principles of representation, compositional similarity, connectivity, viability and ecosystem condition into a single spatial product.<br>Benefits were derived using all NARCliM 1.0 and 3C climate futures, topographically downscaled to 250m resolution. Each benefit was calculated separately using the biodiversity forecasting tool. Refer to the individual benefit products for detailed planning purposes. |

Values in each band are scaled to between 0 (no benefit) and 255 (high benefit). Darker areas reflect lower benefit values and lighter areas reflect higher benefit values. Colours approach white where high benefit values overlap.

[Report section 4.1, Figure 25]

Function: download

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| Manage Benefits 2000 to 2070 | Name: Manage Benefits 2000 to 2070<br><br>Protocol: WWW:DOWNLOAD-1.0-http--download<br><br>Description:<br><br>Climate adaptation benefits provide guidance to conservation practitioners on how to align their actions to avoid or minimise climate-related biodiversity loss. However, to achieve this some long-held principals need to be challenged. We cannot rely on strategies that seek to reconstruct or hold on to species and ecosystems in the places they were once found but are less suited to under future climate. Change must be accepted as inevitable, but we can influence the nature of that change and thereby conserve values, albeit within a dynamic setting.<br><br>Manage benefits are based on the principle of maximising the representation of pre-clearing native vegetation communities by conserving existing vegetation. Many species will need to shift to adapt to a changing climate. This layer two band spatial GeoTif raster layer depicts locations that are suitable for protecting depleted communities now (blue), those that will become increasingly important in the future (red), and those that remain important throughout the process (white).<br><br>As species range shifts are a process that occurs over time, at various rates, it is critical to conserve current distributions as well as prepare for future changes. Some areas are important now and remain important into the future, although their species composition may change. Such areas deserve particular attention.<br><br>Benefits were derived using all NARCliM 1.0 and 3C climate futures, topographically downscaled to 250m resolution.<br><br>Values in each band are scaled to between 0 (no benefit) and 255 (high benefit). Darker areas reflect lower benefit values and lighter areas reflect higher benefit values. Colours approach white where high benefit values overlap.<br><br>Function: download |
| Revegetation Benefits 2000 to 2070 | Name: Revegetation Benefits 2000 to 2070<br><br>Protocol: WWW:DOWNLOAD-1.0-http--download<br><br>Description:<br><br>Climate adaptation benefits provide guidance to conservation practitioners on how to align their actions to avoid or minimise climate-related biodiversity loss. However, to achieve this some long-held principles need to be challenged. We cannot rely on strategies that seek to reconstruct or hold on to species and ecosystems in the places they were once found but are less suited to under future climate. Change must be accepted as inevitable, but we can influence the nature of that change and thereby conserve values, albeit within a dynamic setting.<br><br>Revegetation benefits are based on the principal of maximising representation of pre-clearing native vegetation communities through revegetation in areas that are expected to become suitable for target communities by 2070.<br><br>Revegetation benefits show where investment in restoring degraded landscapes will best increase the persistence of heavily cleared or degraded ecosystems under future climate.<br><br>Rates of loss used to weight the importance of communities are based on past clearing, degradation and fragmentation as well as future contractions, expansions and shifts of bioclimatic envelopes due to climate change.<br><br>Expected future distributions of bioclimatic class envelopes were derived by averaging the impacts of all NARCliM and 3C climate futures, topographically downscaled to 250m resolution.<br><br>Values have been scaled between 0 (no benefit) and 255 (high benefit). Using the supplied layer file, blue areas reflect lower benefit values and darker green areas reflect higher benefit values.<br><br>Function: download |

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| Vegetation class baseline GDM classification | Name: Vegetation class baseline GDM classification<br><br>Protocol: WWW:DOWNLOAD-1.0-http--download<br><br>Description:<br><br>Mapped Vegetation class extents from the New South Wales State Vegetation Type Map (SVTM) were used to classify BIAP's baseline GDM into vegetation classes by applying the most similar class to each pixel in NSW.<br><br>The BIAP baseline GDM's transformed environmental predictors were first reprojected to the GDA94 Australian Albers coordinate system (ESPG:3577) and bilinearly resampled to 90 m from their original 0.0025DD (~250 m) pixel resolution. An equally spaced sampling grid was intersected with SVTM mapped class extents assigning vegetation classes to 101,224 samples (~1:740 sampling rate) across the state. The standard GDM link function (Ferrier et al. 2007) was then applied using the GDM transformed environmental predictors to estimate every pixel's original floristic compositional similarity to each class sample.<br><br>The derived layer shows the BIAP's baseline GDM classified into vegetation classes by applying the class with the most compositionally similar sample from its current extent to each pixel. Vegetation classes are coloured to reflect their compositional similarity so that compositionally similar classes (those with more shared species) are given similar colours.<br><br>Candidate Native Grasslands and Riverine Plain Grasslands were not present in the class similarity matrix so were not assigned a colour (Grey). Alpine fjaeldmarks were not sampled therefore were not allocated to any pixels. The next most compositionally similar classes fill areas where this class occurs.<br><br>The RGB colour values allocated to each class are stored in the raster attribute table.<br><br>Ferrier S, Manion G, Elith J and Richardson K (2007) 'Using generalized dissimilarity modelling to analyse and predict patterns of beta diversity in regional biodiversity assessment', Diversity and Distributions, 13(3):252–264.<br><br>Function: download |

## Unique resource identifier

| | |
|---|---|
| Code | 0b2c400c-e36c-46af-b817-0e7619461910 |
| **Presentation form** | Document digital |
| **Edition** | 1.0 |
| **Dataset language** | English |

## Metadata standard

| | |
|---|---|
| Name | ISO 19115 |
| Edition | 2016 |
| **Dataset URI** | https://datasets.seed.nsw.gov.au/dataset/0b2c400c-e36c-46af-b817-0e7619461910 |
| **Purpose** | Climate impact adaptation |
| **Status** | Completed |
| **Spatial representation type** | grid |

## Spatial reference system

Code identifying

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| the spatial reference system | 4283 |
| Spatial resolution | 10 m |
| Additional information source | Data based on a 1990-2010 climate baseline and NARCliM climate projections to 2020-2039 and 2060-2079 |
| Topic category | |

## Keyword set

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| keyword value | CLIMATE-AND-WEATHER-Climate-change<br>ECOLOGY-Ecosystem |

Originating controlled vocabulary

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|---|---|
| Title | ANZLIC Search Words |
| Reference date | 2008-05-16 |

## Geographic location

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| West bounding longitude | 132.724 |
| East bounding longitude | 165.725 |
| North bounding latitude | -39.749 |
| South bounding latitude | -21.669 |

## Vertical extent information

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| Minimum value | -100 |
| Maximum value | 2228 |

Coordinate reference system

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| Authority code | urn:ogc:def:cs:EPSG:: |
| Code identifying the coordinate reference system | 5711 |

## Temporal extent

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|---|---|
| Begin position | 1990-01-01 |
| End position | N/A |

## Dataset reference date

## Resource maintenance

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|---|---|
| Maintenance and update frequency | Unknown |

Contact info

| | |
|---|---|
| Contact position | Data Broker |
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| Responsible party role | pointOfContact |

## Lineage

Generalised Dissimilarity Modelling (GDM) uses ~250m downscaled NARCliM (V1.0) ANUCLIM climate variables and ANHAT derived biological data to hierarchically classify the NARCliM domain into 250 bioclimatic classes (BCCs).

BCCs provide a surrogate for overall biodiversity. Future shifts in BCC distributions were modelled by projecting the baseline GDM across all NARCliM climate futures.

Biodiversity forecasting analysis considers past clearing, degradation and fragmentation, along with shifts in BCCs to predict impacts on biodiversity persistence and to identify management opportunities to reduce these impacts.

Biodiversity impacts and adaptation strategies are developed through a synthesis of models that support climate change planning and adaptation strategies.

Limitations on public access

## Responsible party

| | |
|---|---|
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| Responsible party role | pointOfContact |

## Metadata point of contact

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|---|---|
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## Metadata date

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## Metadata language