EATLAS DATA CATALOGUE (AIMS)

Coral restoration database – Dataset from Bostrom-Einarsson et al 2019 (NESP TWQ 4.3, JCU)

Metadata | Metadata (XML)
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Title	Coral restoration database – Dataset from Bostrom-Einarsson et al 2019 (NESP TWQ 4.3, JCU)
Date	2019-08-12
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Abstract	This dataset consists of a review of case studies and descriptions of coral restoration methods from four sources: 1) the primary literature (i.e. published peer-reviewed scientific literature), 2) grey literature (e.g. scientific reports and technical summaries from experts in the field), 3) online descriptions (e.g. blogs and online videos describing projects), and 4) an online survey targeting restoration practitioners (doi:10.5061/dryad.p6r3816). Included are only those case studies which actively conducted coral restoration (i.e. at least one stage of scleractinian coral life-history was involved). This excludes indirect coral restoration projects, such as disturbance mitigation (e.g. predator removal, disease control etc.) and passive restoration interventions (e.g. enforcement of control against dynamite fishing or water quality improvement). It also excludes many artificial reefs, in particular if the aim was fisheries enhancement (i.e. fish aggregation devices), and if corals were not included in the method. To the best of our abilities, duplication of case studies was avoided across the four separate sources, so that each case in the review and database represents a separate project. This dataset is currently under embargo until the publication of review manuscript is made available. Methods: More than 40 separate categories of data were recorded from each case study and entered into a database. These included data on (1) the information source, (2) the case study particulars (e.g. location, duration, spatial scale, objectives, etc.), (3) specific details about the methods, (4) coral details (e.g. genus, species, morphology), (5) monitoring details, and (6) the outcomes and conclusions. Primary literature Multiple search engines were used to achieve the most complete coverage of the scientific literature. First, the scientific literature was searched using Google Scholar with the keywords “coral* + restoration”. Because the field (and therefore search results) are dominated by transplantation studies, separate searches were then conducted for other common techniques using “coral* + restoration + [technique name]”. This search was further complemented by using the same keywords in ISI Web of Knowledge (search yield n=738). Studies were then manually selected that fulfilled our criteria for active coral restoration described above (final yield n= 221). In those cases where a single paper describes several different projects or methods, these were split into separate case studies. Finally, prior reviews of coral restoration were consulted to obtain case studies from their reference lists. Grey literature

While many reports appeared in the Google Scholar literature searches, The Nature Conservancy (TNC) database of reports for North American coastal restoration projects (http://projects.tnc.org/coastal/) was also conducted. This was supplemented with reports listed in the reference lists of other papers, reports and reviews, and during the online searches (n=30).

Online records
Small-scale projects conducted without substantial input from researchers, academics, non-governmental organisations (NGO) or coral reef managers often do not result in formal written accounts of methods. To access this information, we conducted online searches of YouTube, Facebook and Google, using the search terms “Coral restoration”. The information provided in videos, blog posts and websites to describe further projects (n=48) was also used. Due to the unverified nature of such accounts, the data collected from these online-only records was limited compared to peer reviewed literature and surveys. At the minimum, the location, the methods used and reported outcomes or lessons learned were included in this review.

Online survey
To access information from projects not published elsewhere, an online survey targeting restoration practitioners was designed. The survey consisted of 25 questions querying restoration practitioners regarding projects they had undertaken under JCU human ethics H7218 (following the Australian National Statement on Ethical Conduct in Human Research, 2007). These data (n=63) are included in all calculations within this review, but are not publicly available to preserve the anonymity of participants. Although we encouraged participants to fill out a separate survey for each case study, it is possible that participants included multiple separate projects in a single survey, which may reduce the real number of case studies reported.

Data analysis
Percentages, counts and other quantifications from the database refer to the total number of case studies with data in that category. Case studies where data were lacking for the category in question, or lack appropriate detail (e.g. reporting ‘mixed’ for coral genera) are not included in calculations. Many categories allowed multiple answers (e.g. coral species); these were split into separate records for calculations (e.g. coral species n). For this reason, absolute numbers may exceed the number of case studies in the database. However, percentages reflect the proportion of case studies in each category. We used the seven objectives outlined in [1] to classify the objective of each case study, with an additional two categories (‘scientific research’ and ‘ecological engineering’). We used Tableau to visualise and analyse the database (Desktop Professional Edition, version 10.5, Tableau Software). The data have been made available following the FAIR Guiding Principles for scientific data management and stewardship [2]. Data available from the Dryad Digital Repository downloaded here (https://doi.org/10.5061/dryad.p6r3816), and visually explored: https://public.tableau.com/views/CoralRestorationDatabase-Visualisation/Coralrestorationmethods?:embed=y&:display_count=yes&publish=yes&:showVizHome=no#1.

Limitations:
While our expanded search enabled us to avoid the bias from the more limited published literature, we acknowledge that using sources that have not undergone rigorous peer-review potentially introduces another bias. Many government reports undergo an informal peer-review; however, survey results and online descriptions may present a subjective account of restoration outcomes. To reduce subjective assessment of case studies, we opted not to interpret results or survey answers, instead only recording what was explicitly stated in each document [3, 4].

Defining restoration
In this review, active restoration methods are methods which reintroduce coral (e.g. coral fragment transplantation, or larval enhancement) or augment coral assemblages (e.g. substrate stabilisation, or algal removal), for the purposes of restoring the reef ecosystem. In the published literature and elsewhere, there are many terms that describe the same intervention. For clarity, we provide the terms we have used in the review, their definitions and alternative terms (see references). Passive restoration methods such as predator removal (e.g. crown-of-thorns starfish and Drupella control) have been excluded, unless they were conducted in conjunction with active restoration (e.g. macroalgal removal combined with transplantation).

Format:
The data is supplied as an excel file with three separate tabs for 1) peer reviewed literature 2) grey literature, and 3) a description of the objectives form Hein et al. 2017. Survey responses have been excluded to preserve the anonymity of the respondents.

	This dataset is a database that underpins a 2018 report and 2019 published review of coral restoration methods from around the world. - Bostrom-Einarsson L, Ceccarelli D, Babcock R.C., Bayraktarov E, Cook N, Harrison P, Hein M, Shaver E, Smith A, Stewart-Sinclair P.J, Vardi T, McLeod I.M. 2018 - Coral restoration in a changing world - A global synthesis of methods and techniques, report to the National Environmental Science Program. Reef and Rainforest Research Centre Ltd, Cairns (63pp.). - Review manuscript is currently under review. Data Dictionary: The Data Dictionary is emended in the excel spreadsheet. Comments are included in the column titles to aid interpretation, and/or refer to additional information tabs. For more information on each column, open the red triangle [located top right of cell]. References: 1. Hein MY, Willis BL, Beeden R, Birtles A. The need for broader ecological and socioeconomic tools to evaluate the effectiveness of coral restoration programs. Restoration Ecology. Wiley/Blackwell (10.1111); 2017;25: 873–883. doi:10.1111/rec.12580 2. Wilkinson MD, Dumontier M, Aalbersberg IJ, Appleton G, Axton M, Baak A, et al. The FAIR Guiding Principles for scientific data management and stewardship. Scientific Data 2016 3. Nature Publishing Group; 2016;3: 160018. doi:10.1038/sdata.2016.18 3.Miller RL, Marsh H, Cottrell A, Hamann M. Protecting Migratory Species in the Australian Marine Environment: A Cross-Jurisdictional Analysis of Policy and Management Plans. Front Mar Sci. Frontiers; 2018;5: 211. doi:10.3389/fmars.2018.00229 4. Ortega-Argueta A, Baxter G, Hockings M. Compliance of Australian threatened species recovery plans with legislative requirements. Journal of Environmental Management. Elsevier; 2011;92: 2054–2060. Data Location: This dataset is filed in the eAtlas enduring data repository at: data\2018-2021-NESP-TWQ-4\4.3_Best-practice-coral-restoration

Metadata language	eng
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Hierarchy level	Dataset

OnLine resource

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Protocol	WWW:LINK-1.0-http--metadata-URL
Linkage	https://nesptropical.edu.au/index.php/round-4-projects/project-4-3/
Protocol	WWW:LINK-1.0-http--related
Linkage	https://eatlas.org.au/data/uuid/71127e4d-9f14-4c57-9845-1dce0b541d8d
Protocol	WWW:LINK-1.0-http--related
Linkage	https://eatlas.org.au/nesp-twq-4/coral-restoration-4-3
Protocol	WWW:LINK-1.0-http--related
Linkage	https://doi.org/10.5061/dryad.p6r3816
Protocol	WWW:LINK-1.0-http--downloaddata
Linkage	https://public.tableau.com/views/CoralRestorationDatabase-Visualisation/Coralrestorationmethods?:embed=y&:display_count=yes&publish=yes&
Protocol	WWW:LINK-1.0-http--downloaddata

Point of contact

Individual name	Bostrom-Einarsson, Lisa, Dr.
Organisation name	TropWATER, James Cook University
Role	Point of contact
Topic category	Biota

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Metadata author

Individual name	eAtlas Data Manager
Organisation name	Australian Institute of Marine Science (AIMS)
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