

Land-Sea Conservation Planning

Summary of research innovations developed in collaboration with Carissa Klein, funded by grants from the Australian Research Council (Discovery and Linkage), Science for Nature and People Partnership, National Centre for Ecological Analysis and Synthesis, WWF-Australia, and the Wildlife Conservation Society



Terrestrial activities impact marine ecosystems

We produce quantitative models that predict how various land-uses - including oil palm, agriculture, urban development, and forestry – impact seagrass, mangrove, and coral reef ecosystems and marine species. These models were developed to inform conservation and management decisions.



Prioritising management actions to mitigate impacts

Using decision science, we develop methods for determining the most cost-effective strategies for conserving coastal ecosystems, answering questions like: Should we protect or restore the land or sea to conserve sea grass? Where is the best place for developing agriculture or forestry to minimise negative impacts on coral reefs?



Decision support tools for protecting the ocean

We have synthesised research, developed planning guidelines, and produced quantitative tools to assist conservation planners and natural resource managers faced with difficult decisions about how, what, and where to best protect marine biodiversity around the world.

Watts et al 2009, *Enviro Mod & Soft* • Alvarez-Romero et al 2011, *Ann Review EES* • Klein et al 2010, *PLOS One* • Klein et al 2012, *Eco Apps* • Klein et al 2014, *Mar Pol* • Klein et al 2014, *Mar Pol* • Klein et al 2013, *Cons Let* • Makino et al 2013, *Bio Cons* • Mills et al 2016, *Cons Let* • Beher et al 2016, *Enviro Sci & Pol* • Atkinson et al 2016, *PLOS One* • Tulloch et al 2016, *Bio Cons* • Klein et al 2017, *Cons Let* • Fredston-Hermann et al 2016, *Front Mar Sci* • Brown et al 2017, *Sci Rep* • Jupiter et al 2017, *Enviro Con* • Saunders et al 2017, *PLOS Bio* • Brown et al 2017, *Mar Eco Prog Series* • Saunders et al 2017, *PLOS One* • Brown et al 2019, *J of App Eco* • Wenger et al 2020, *J of App Eco* • **Full References on Reverse**

Authors	Title	Journal	Year
Watts, Matthew E; Ball, Ian R; Stewart, Romola S; Klein , Carissa J; Wilson, Kerrie; Steinback, Charles; Lourival, Reinaldo; Kircher, Lindsay; Possingham, Hugh P	Marxan with Zones: Software for optimal conservation based land-and sea-use zoning	Environmental Modelling & Software	2009
Alvarez-Romero, Jorge G; Pressey, Robert L; Ban, Natalie C; Vance-Borland, Ken; Willer, Chuck; Klein , Carissa Joy; Gaines, Steven D	Integrated land-sea conservation planning: the missing links	Annual Review of Ecology, Evolution, and Systematics	2011
Klein , Carissa J; Ban, Natalie C; Halpern, Benjamin S; Beger, Maria; Game, Edward T; Grantham, Hedley S; Green, Alison; Klein, Travis J; Kininmonth, Stuart; Trembl, Eric; Wilson, Kerrie; Possingham, Hugh P	Prioritizing land and sea conservation investments to protect coral reefs	PLoS One	2010
Klein , Carissa Joy; Jupiter, Stacy D; Selig, Elizabeth R; Watts, Matthew E; Halpern, Benjamin S; Kamal, Muhammad; Roelfsema, Chris; Possingham, Hugh P	Forest conservation delivers highly variable coral reef conservation outcomes	Ecological Applications	2012
Klein , Carissa; Jupiter, Stacy; Watts, Matthew; Possingham, Hugh	Evaluating the influence of candidate terrestrial protected areas on coral reef condition in Fiji	Marine Policy	2014
Klein , Carissa J; Jupiter, Stacy D; Possingham, Hugh P	Setting conservation priorities in Fiji: Decision science versus additive scoring systems	Marine Policy	2014
Klein , Carissa J; Tulloch, Vivitskaia J; Halpern, Benjamin S; Selkoe, Kimberly A; Watts, Matthew E; Steinback, Charles; Scholz, Astrid; Possingham, Hugh P	Tradeoffs in marine reserve design: habitat condition, representation, and socioeconomic costs	Conservation Letters	2013
Makino, Azusa; Beger, Maria; Klein , Carissa J; Jupiter, Stacy D; Possingham, Hugh P	Integrated planning for land-sea ecosystem connectivity to protect coral reefs	Biological Conservation	2013
Mills, Morena; Leon, Javier X; Saunders, Megan I; Bell, Justine; Liu, Yan; O'Mara, Julian; Lovelock, Catherine E; Mumby, Peter J; Phinn, Stuart; Possingham, Hugh P; Tulloch, Vivitskaia; Mutafoğlu, Konar; Morrison, Tiffany; Callaghan, David P; Baldock, Tom; Klein , Carissa J; Hoegh-Guldberg, Ove.	Reconciling development and conservation under coastal squeeze from rising sea level	Conservation Letters	2016
Behr, Jutta; Possingham, Hugh P; Hoobin, Sean; Dougall, Cameron; Klein , Carissa	Prioritising catchment management projects to improve marine water quality	Environmental science & policy	2016
Atkinson, Scott C; Jupiter, Stacy D; Adams, Vanessa M; Ingram, J Carter; Narayan, Siddharth; Klein , Carissa J; Possingham, Hugh P	Prioritising mangrove ecosystem services results in spatially variable management priorities	PLoS One	2016
Tulloch, Vivitskaia JD; Brown, Christopher J; Possingham, Hugh P; Jupiter, Stacy D; Maina, Joseph M; Klein , Carissa	Improving conservation outcomes for coral reefs affected by future oil palm development in Papua New Guinea	Biological Conservation	2016
Klein , Carissa J; Behr, Jutta; Chaloupka, Milani; Hamann, Mark; Limpus, Colin; Possingham, Hugh P	Prioritization of marine turtle management projects: A protocol that accounts for threats to different life history stages	Conservation Letters	2017
Fredston-Hermann, Alexa; Brown, Christopher J; Albert, Simon; Klein , Carissa J; Mangubhai, Sangeeta; Nelson, Joanna L; Teneva, Lida; Wenger, Amelia; Gaines, Steven D; Halpern, Benjamin S	Where does river runoff matter for coastal marine conservation?	Frontiers in Marine Science	2016
Brown, Christopher J; Jupiter, Stacy D; Albert, Simon; Klein , Carissa J; Mangubhai, Sangeeta; Maina, Joseph M; Mumby, Peter; Olley, Jon; Stewart-Koster, Ben; Tulloch, Vivitskaia; Wenger, Amelia.	Tracing the influence of land-use change on water quality and coral reefs using a Bayesian model	Scientific reports	2017
Jupiter, Stacy D; Wenger, Amelia; Klein , Carissa J; Albert, Simon; Mangubhai, Sangeeta; Nelson, Joanna; Teneva, Lida; Tulloch, Vivitskaia J; White, Alan T; Watson, James EM	Opportunities and constraints for implementing integrated land-sea management on islands	Environmental Conservation	2017
Saunders, Megan I; Bode, Michael; Atkinson, Scott; Klein , Carissa J; Metaxas, Anna; Behr, Jutta; Beger, Maria; Mills, Morena; Giakoumi, Sylvaine; Tulloch, Vivitskaia; Possingham, Hugh P.	Simple rules can guide whether land-or ocean-based conservation will best benefit marine ecosystems	PLoS Biology	2017
Brown, Christopher J; Jupiter, Stacy D; Lin, Hsien-Yung; Albert, Simon; Klein , Carissa; Maina, Joseph M; Tulloch, Vivitskaia JD; Wenger, Amelia S; Mumby, Peter J	Habitat change mediates the response of coral reef fish populations to terrestrial run-off	Marine Ecology Progress Series	2017
Saunders, Megan Irene; Atkinson, Scott; Klein , Carissa Joy; Weber, Tony; Possingham, Hugh P	Increased sediment loads cause non-linear decreases in seagrass suitable habitat extent	PloS One	2017
Brown, Christopher J; Jupiter, Stacy D; Albert, Simon; Anthony, Kenneth RN; Hamilton, Richard J; Fredston-Hermann, Alexa; Halpern, Benjamin S; Lin, Hsien-Yung; Maina, Joseph; Mangubhai, Sangeeta; Mumby, Peter J.; Possingham, Hugh P; Saunders, Megan I; Tulloch, Vivitskaia; Wenger, Amelia; Klein , Carissa J	A guide to modelling priorities for managing land-based impacts on coastal ecosystems	Journal of Applied Ecology	2019
Wenger, Amelia; Harris, Daniel; Weber, Samuel; Vaghi, Ferguson; Nand, Yashika; Naisilisili, Waisea; Hughes, Alec; Delevaux, Jade; Klein , Carissa; Watson, James; Mumby, Peter; Jupiter, Stacy	Best-practice forestry management delivers diminishing returns for coral reefs with increased land-clearing	Journal of Applied Ecology	2020