**Supplementary Material**

**Table S1.** Strategic International Union for Conservation of Nature Red List of Ecosystems (IUCN RLE) assessments (IUCN RLE criteria version 2). T: terrestrial, M: marine, F: freshwater. NA: Not Available.

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| **Ecosystem** | **Countries** | **Reference** |
| *Freshwater ecosystems* |  |  |
| Aral Sea | Uzbekistan and Kazakhstan | Keith et al. 2013 |
| German tamarisk-pioneer vegetation | Regional (Europe) | Keith et al. 2013 |
| Raised bogs of Germany | Germany | Keith et al. 2013 |
| Coastal sandstone upland swamps | Australia | Keith et al. 2013 |
| Connected wetlands of the Lake Eyre Basin | Australia | Pisanu et al. 2015 |
| Floodplain ecosystem of river Red Gum and Black Box, south-eastern Australia | Australia | Keith et al. 2013 |
| Karst rising-spring wetland community of south-east Australia | Australia | Keith et al. 2013 |
| Swamps, marshes and lakes in the Murray-Darling Basin | Australia | Keith et al. 2013 |
| *Marine ecosystems* |  |  |
| Caribbean coral reefs | Regional | Keith et al. 2013 |
| Giant kelp forests, Alaska | United States of America | Keith et al. 2013 |
| Meso-American Reef | Mexico, Belize, Guatemala, and Honduras | Bland et al. 2017b |
| Antarctic shallow invertebrate-dominated ecosystems | Regional | Clark et al. 2015 |
| Tidal flats of the Yellow Sea | China, North Korea, and South Korea | Murray et al. 2015 |
| European reedbeds | Regional (Europe) | Keith et al. 2013 |
| Intertidal mudflats of the French Atlantic coast | France | Carré et al. 2012 |
| Coorong lagoons and Murray Mouth inverse estuary, South Australia | Australia | Keith et al. 2013 |
| Seagrass community, South Australia | Australia | Keith et al. 2013 |
| Southern Benguela | South Africa |  | Bland et al. 2018 |
| Chesapeake Bay estuarine ecosystem | United States of America |  | Mahoney & Bishop 2017 |
| *Terrestrial ecosystems* |  |  |
| Cape flats sand fynbos | South Africa | Keith et al. 2013 |
| Gonakier forests of Senegal river floodplain | Senegal and Mauritania | Keith et al. 2013 |
| Tapia forest | Madagascar | Keith et al. 2013 |
| Great Lakes alvar | United States of America and Canada | Keith et al. 2013 |
| Tepui shrublands | Venezuela | Keith et al. 2013 |
| Alpine snow patch herbfields | Australia | Williams et al. 2015 |
| Coastal lowland rainforests of the wet tropics bioregion, Queensland | Australia | Metcalfe & Lawson 2015 |
| Coolibah — Black Box woodlands | Australia | Keith et al. 2013 |
| Cumberland plain woodland | Australia | Tozer et al. 2015 |
| Eastern Stirling range mountain heath and thicket community | Australia | Barrett & Yates 2015 |
| Fringe mangrove forests | Philippines | Marshall et al. 2018 |
| Georgina gidgee woodlands | Australia | Wardle et al. 2015 |
| Gnarled mossy cloud forest, Lord Howe Island | Australia | Auld & Leishman 2015 |
| Granite gravel fields and sand plains | New Zealand | Keith et al. 2013 |
| Ironstone shrubland | Australia | English & Keith 2015 |
| Mock olive — Wilga — Peach bush — Carissa dry sub-tropical semi-evergreen vine thicket | Australia | Keith et al. 2013 |
| Mountain ash forest | Australia | Burns et al. 2015 |

**Table S2.** Proposed International Union for Conservation of Nature Red List of Ecosystems indicators and processes to inform the Aichi Targets of the Convention on Biological Diversity. The Red List Index of Ecosystems is based on overall ecosystem status, the Ecosystem Area Index is derived from trends in ecosystem area (criterion A), and the Ecosystem Health Index is derived from trends in ecological function (criteria C and D; Rowland 2018).

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| **Aichi Target** | **Summary** | **Indicators and processes** | **Progress** |
| Target 2 | Incorporation of biodiversity into national and local development, poverty reduction strategies, and national accounting | Incorporation of the Red List of Ecosystems into legislation, land-use planning (local and regional), natural capital accounts, and poverty-reduction strategies | Future |
| Target 4 | Plans for sustainable production and consumption | Red List Index for Ecosystems (impacts of utilization) | Future |
|  |  | Number of ecosystems managed with ecosystem-based approaches | Future |
| Target 5 | Reduction in the rate of loss of natural habitats | Red List Index for Ecosystems and Ecosystem Area Index (forests, wetlands, etc.) | Piloted for forests of the Americas and Colombian terrestrial ecosystems (Rowland 2018) |
| Target 6 | Sustainable fisheries | Red List Index for Ecosystems (exploited marine and freshwater ecosystems) | Piloted for a single ecosystem (Bland et al. 2018) |
| Target 7 | Sustainable management of agriculture, aquaculture, and forestry | Red List Index for Ecosystems (modified ecosystems and forests) | Future |
| Target 8 | Pollution at levels not detrimental to ecosystem function and biodiversity | Red List Index for Ecosystems (impacts of pollution) | Future |
| Target 9 | Invasive alien species management | Red list Index for Ecosystems (impacts of invasive alien species) | Future |
| Target 10 | Minimization of threats to reefs and other ecosystems threatened by climate change | Red list Index for Ecosystems (reef-building corals) | Future |
|  |  | Red list Index for Ecosystems (impacts of climate change) | Future |
| Target 11 | Protected area designation and management | Proportion of ecosystems (including threatened ecosystems) included in protected areas | Implementation at the national scale (e.g., Colombia) |
| Target 14 | Management of ecosystem services | Red list Index for Ecosystems (exploited ecosystems) | Piloted for a single ecosystem (Bland et al. 2018) |
| Target 15 | Management of ecosystem resilience and carbon sequestration | Red list Index for Ecosystems (restored ecosystems) |  |
| Target 19 | Improvement in biodiversity knowledge | Number of ecosystems assessed and proportion of land/sea assessed with the Red List of Ecosystems.Knowledge-transfer strategies. | Herein |

**Table S3.** Proposed International Union for Conservation of Nature Red List of Ecosystems indicators and processes to inform the United Nations Sustainable Development Goals (SDG). The Red List Index of Ecosystems is based on overall ecosystem status, the Ecosystem Area Index is derived from trends in ecosystem area (criterion A), and the Ecosystem Health Index is derived from trends in ecological function (criteria C and D; Rowland 2018).

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| **SDG** | **Summary** | **Indicators and processes** | **Progress** |
| Goal 2 | End hunger, achieve food security and improved nutrition and promote sustainable agriculture | Red List Index for Ecosystems in agricultural areas or threatened by agricultural production | Future |
| Goal 6 | Ensure availability and sustainable management of water and sanitation for all | Red List Index for Ecosystems and Ecosystem Health Index (impacts of pollution) for water bodiesRed List Index for Ecosystems, Ecosystem Area Index, and Ecosystem Health Index (impacts of water extraction)Red List Index for Ecosystems, Ecosystem Area Index, and Ecosystem Health Index of water-related ecosystemsProportion of threatened water-related ecosystems in protected areas | FutureFutureFutureFuture |
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| Goal 11 | Make cities and human settlements inclusive, safe, resilient and sustainable | Red List Index of Ecosystems for ecosystems with cultural value, natural value, or World Heritage DesignationIncorporation of the Red List of Ecosystems into disaster risk reduction, in particular for cities and human settlements | FutureFuture |
| Goal 12 | Ensure sustainable consumption and production patterns | Incorporation of the Red List of Ecosystems into indices of sustainable natural resource extractionIntegration of the Red List of Ecosystems with sustainable business practices | FuturePiloted in Colombia (http://www.tremarctoscolombia.org/) |
| Goal 13 | Take urgent action to combat climate change and its impacts | Red List Index of Ecosystems for ecosystems of importance to disaster risk reduction strategies. | Future |
| Goal 14 | Conserve and sustainably use the oceans, seas and marine resources for sustainable development | Red List Index for Ecosystems (marine ecosystems)Coverage and representativeness of threatened marine ecosystems included in protected areas | Piloted for a single ecosystem (Bland et al. 2018)Future |
| Goal 15 | Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss | Red List Index for Ecosystems (forests, terrestrial and inland freshwater ecosystems)Coverage and representativeness of terrestrial and freshwater threatened ecosystems in protected areasEcosystem Area Index and Ecosystem Health index (forests)Degree to which the Red List of Ecosystems is included in forest eco-certification schemesRed List Index for Ecosystems (impacts of desertification)Red List Index for Ecosystems (mountains).Coverage and representativeness of threatened mountain ecosystems in protected areasRed List Index for Ecosystems (all ecosystems)Red List Index for Ecosystems (impacts of invasive species)Incorporation of the Red List of Ecosystems into legislation, land-use planning (local and regional), natural capital accounts, and poverty-reduction strategies (see Aichi Target 2) | Piloted for forests of the Americas and Colombian terrestrial ecosystems (Rowland 2018)FuturePiloted for forests of the Americas (Rowland 2018)Voluntary use in Norway and FinlandFutureFutureFuturePiloted in Colombia (Rowland 2018)FutureOn-going |

**References**

Auld, T.D. & Leishman, M.R. (2015). Ecosystem risk assessment for Gnarled Mossy Cloud Forest, Lord Howe Island, Australia. *Austral Ecol.*, 40, 364–372.

Barrett, S. & Yates, C.J. (2015). Risks to a mountain summit ecosystem with endemic biota in southwestern Australia. *Austral Ecol.*, 40, 423–432.

Bland, L.M., Regan, T.J., Dinh, M.N., Ferrari, R., Keith, D.A., Lester, R., Mouillot, D., Murray, N.J., Nguyen, H.A. & Nicholson, E. (2017). Using multiple lines of evidence to assess the risk of ecosystem collapse. *Proceedings. Biol. Sci.*, 284, 20170660.

Bland, L.M., Watermeyer, K.E., Keith, D.A., Nicholson, E., Regan, T.J. & Shannon, L.J. (2018). Assessing risks to marine ecosystems with indicators, ecosystem models and experts. *Biol. Conserv.*, 227, 19–28.

Burns, E.L., Lindenmayer, D.B., Stein, J., Blanchard, W., McBurney, L., Blair, D. & Banks, S.C. (2015). Ecosystem assessment of mountain ash forest in the Central Highlands of Victoria, south-eastern Australia. *Austral Ecol.*, 40, 386–399.

Carré, A., Poulin, B. & Peguin, M. (2012). *Liste Rouge des Écosystèmes de l’UICN. Exercice d’application sur quelques écosystèmes de Zones Humides de France métropolitaine.*

Clark, G.F., Raymond, B., Riddle, M.J., Stark, J.S. & Johnston, E.L. (2015). Vulnerability of Antarctic shallow invertebrate-dominated ecosystems. *Austral Ecol.*, 40, 482–491.

English, V. & Keith, D.A. (2015). Assessing risks to ecosystems within biodiversity hotspots: a case study from southwestern Australia. *Austral Ecol.*, 40, 411–422.

Keith, D.A., Rodríguez, J.P., Rodríguez-Clark, K.M., Nicholson, E., Aapala, K., Alonso, A., Asmussen, M., Bachman, S., Basset, A., Barrow, E.G., Benson, J.S., Bishop, M.J., Bonifacio, R., Brooks, T.M., Burgman, M.A., Comer, P., Comín, F.A., Essl, F., Faber-Langendoen, D., Fairweather, P.G., Holdaway, R.J., Jennings, M., Kingsford, R.T., Lester, R.E., Nally, R. Mac, McCarthy, M.A., Moat, J., Oliveira-Miranda, M.A., Pisanu, P., Poulin, B., Regan, T.J., Riecken, U., Spalding, M.D. & Zambrano-Martínez, S. (2013). Scientific Foundations for an IUCN Red List of Ecosystems. *PLoS One*, 8, e62111.

Mahoney, P.C. & Bishop, M.J. (2017). Assessing risk of estuarine ecosystem collapse. *Ocean Coast. Manag.*, 140, 46–58.

Marshall, A., Schulte to Bühne, H., Bland, L. & Pettorelli, N. (2018). Assessing ecosystem collapse risk in ecosystems dominated by foundation species: The case of fringe mangroves. *Ecol. Indic.*, 91, 128–137.

Metcalfe, D.J. & Lawson, T.J. (2015). An International Union for Conservation of Nature risk assessment of coastal lowland rainforests of the Wet Tropics Bioregion, Queensland, Australia. *Austral Ecol.*, 40, 373–385.

Murray, N.J., Ma, Z. & Fuller, R.A. (2015). Tidal flats of the Yellow Sea: A review of ecosystem status and anthropogenic threats. *Austral Ecol.*, 40, 472–481.

Pisanu, P., Kingsford, R.T., Wilson, B. & Bonifacio, R. (2015). Status of connected wetlands of the Lake Eyre Basin, Australia. *Austral Ecol.*, 40, 460–471.

Rowland, J.A. (2018). Biodiversity indicators for ecosystems to support global conservation targets. *in prep.*

Tozer, M.G., Leishman, M.R. & Auld, T.D. (2015). Ecosystem risk assessment for Cumberland Plain Woodland, New South Wales, Australia. *Austral Ecol.*, 40, 400–410.

Wardle, G.M., Greenville, A.C., Frank, A.S.K., Tischler, M., Emery, N.J. & Dickman, C.R. (2015). Ecosystem risk assessment of Georgina gidgee woodlands in central Australia. *Austral Ecol.*, 40, 444–459.

Williams, R.J., Wahren, C.-H., Stott, K.A.J., Camac, J.S., White, M., Burns, E., Harris, S., Nash, M., Morgan, J.W., Venn, S., Papst, W.A. & Hoffmann, A.A. (2015). An International Union for the Conservation of Nature Red List ecosystems risk assessment for alpine snow patch herbfields, South-Eastern Australia. *Austral Ecol.*, 40, 433–443.