

Nature Positive Initiative State of Nature Metrics: Terrestrial Pilot Case Study – MS&AD

MS&AD Insurance Group is a Japanese insurance company that has long focused on nature-related issues as a source of medium- to long-term risks and opportunities for businesses. They have actively conducted research and external communication on biodiversity and have supported corporate clients in assessing nature-related risks and enhancing their disclosures as part of their consulting activity.

A) Where MS&AD applied the metrics

Location	Kuma River basin, southern Japan
Pilot site	Wetland restoration project
Pilot area size	Wetland site: 2 ha Basin: 30 km x 15 km, with the Kuma River extending 115 km and draining a catchment of 1,880 km ²
Ecosystems covered	Wetland habitat connecting paddy fields, rivers and surrounding forests and providing habitat for wetland plants, aquatic insects and amphibians. These wetlands provide important flood-prevention infrastructure for the basin.
Metrics piloted & granularity	All metrics were piloted and different granularity levels were tested for each metric.
Piloting partner(s)	TNFD



Figure 1: Kuma Basin

B) How and why the piloting project was completed

MS&AD has seen water-related disaster losses become a critical management issue as part of its insurance activities and has increasingly come to recognise the importance of nature-based solutions. MS&AD began collaborating with researchers at the Prefectural University of Kumamoto and Kumamoto University, supported by the Japan Science and Technology Agency, to conserve a group of historical wetlands in the Kumagawa river basin and better understand their contribution to flood management. The target site for state of nature metric piloting was a 2 ha wetland, which functions as natural flood-management infrastructure by attenuating runoff, storing stormwater, sustaining spring flows, and stabilizing slopes.

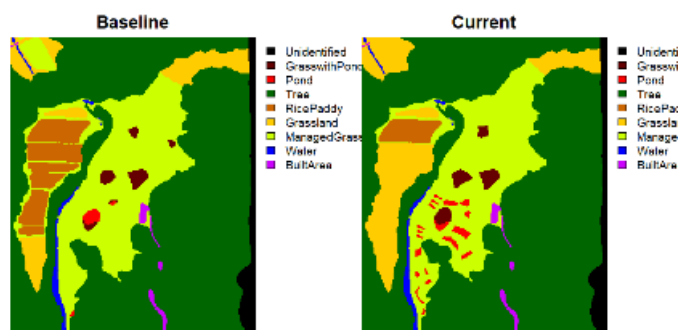


Figure 2: Landcover results



For the piloting, MS&AD collaborated with the Nature Positive Sustainable Development Hub at Tohoku University. To facilitate the calculation of the metrics, researchers at Tohoku University also wrote R code to calculate these metrics and plan to release an open package to disseminate these tools.

C) Key measurement approaches and tools used

	Ecosystem (condition and extent)	Species
Approaches	Followed Nature Positive Initiative guidance, relying on remote-sensing data (satellite imagery, aerial photographs) and ground-truthed data obtained from local governments, academic partners, and prior field studies.	<i>Extinction risk:</i> Used Red List ratings (national/prefectural) and field surveys, and eDNA species distribution data to calculate weighted extinction risk (STAR-t scores) for each land-use category. Taxonomic coverage was expanded using available occurrence data and estimating the Area of Habitat (AOH) approach. <i>Populations:</i> Used mark-recapture data for two priority species to estimate population size with a dynamic N-mixture model (a type of time-series abundance model that considers imperfect detection) for high granularity, and explored the potential of using eDNA.
Tools / data sources	- Low granularity: Esri Land Cover data - Medium granularity: Vegetation map, Sentinel data - High granularity: Drone and aerial images - Ecosystem condition layers: Normalised Difference Water Index and Normalised Difference Vegetation Index.	- Extinction risk: STAR-t scores, GBIF occurrence data for plants, field survey occurrence data for aquatic organisms. - Populations: eDNA and mark-recapture data

D) Key challenges encountered and how the framework was adjusted to ensure practicality



- *Data resolution:* MS&AD has found that State of Nature metrics are more difficult to apply at very small sites due to the limited resolution of input data. The pilot also highlighted the need for higher-resolution classification data to assess broad-scale trends more accurately



- *Inclusion of human intervention:* the aim of MS&AD is not to restore a “pristine” system, but actively manage successional processes by reintroducing moderate disturbance, an approach that differs from conservation vs. development dichotomy

NPI notes: How feedback was incorporated

- Additional detail was added to the guidance on applying metrics at very small sites, including noting that the high granularity level approaches are likely to be more appropriate for such sites and that a focus may be placed on species population measurement if it is not possible to obtain meaningful extinction risk metric data (for very small sites only).
- The need for additional technical standardisation and guidance for measuring ecosystem condition has been identified for further work. At present, full flexibility has been maintained for companies to use a reference state that is most meaningful for their context to model and validate their condition class measurements.



E) Why is it important for companies to measure state of nature metrics?

MS&AD felt that, for companies, the greatest benefit of applying the State of Nature Metrics is the ability to communicate the outcomes of their activities and the condition of surrounding ecosystems through objective, comparable indicators based on a common evaluation framework. They noted the importance of supplementing the core universal set of metrics with context- and ecosystem service-specific metrics for their research project.



“We believe that by enhancing nature, we can not only mitigate escalating flood risks, but also build resilient and flourishing communities sustained by rich ecosystems. The key to achieving this vision lies in advanced analyses that bridge the state of nature and the impact on flood risk mitigation, illuminating pathways toward transformative solutions. Inspired by the insights and challenges highlighted in this pilot, we remain committed to pursuing this important journey and to embracing the challenges that lie ahead.”

Hiroko Urshima, Senior Specialist
MS&AD Insurance Group



Learn more about the State of Nature Metrics: naturepositive.org/metrics

