

# SEG 2024 Conference: Sustainable Mineral Exploration and Development

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## Staged Pacha-Styled Mineral Prospectivity Mapping in NW Queensland

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This study shows a novel approach to multicommodity exploration targeting in North-West Queensland, Australia. The approach involves the use of innovative tools to identify prospective areas using a guide for assigning importance, applicability, and confidence weighting values attributed to different factors related to the mineral system components. The dataset was chosen due to the need to target prospective areas with multicommodity lateral thinking and the creation of new vectors, which contribute as reliable tools to make a significant discovery that generates a positive impact on Australian society.

The key focus was data integration and innovation as tools for geological exploration. Therefore, our staged model integrated several datasets to create feasible new vectors concerning the mineral system components such as felsic and mafic anomalies, the use of MT Anomalies as vectors for producing igneous fertility at different depths, traps, and source of metals, reactivity/metal enrichment capacity index, the use of isotopic mantle ages (Terrane Definition Tool), application of concentration-number in multi-fractal model applied to the geochemistry and the calculation of an innovative factor termed “Litho-Structural Endowment”. Likewise, the integration of environmental, social, and mining variables to create a final product named Staged Pacha-Styled Mineral Prospectivity Mapping which offers a holistic approach with scale of impact for multicommodity exploration targeting in North-West Queensland – Australia. The inclusion of environmental and social aspects as an overlay to this prospective framework has added an extra responsible, ethical, and sustainable approach to targeting. This applied methodology has allowed us to achieve a significant correlation with previously identified deposits, reaching a 90.50% correlation in all types of deposits and almost 98% excluding phosphate deposits.

This study was conducted by the Pacha Team in the context of the Frank Arnott - Next Generation Explorers Award 2024, which won the grand prize at the PDAC convention.