

Gayini proposed project overview

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Planet Research Data Commons Activity	1.1 Exemplar trusted environmental data and information supply chains
Lead organisation	UNSW Centre for Ecosystem Science (UNSW CES)
Partner organisations	<p>Gayini Management Consortium: Nari Nari Tribal Council (NNTC), The Nature Conservancy, Murray-Darling Wetlands Working Group, with UNSW CES.</p> <p>Charles Sturt Uni, Griffith Uni - Australian Rivers Institute, UniMelb, James Cook Uni, Murray-Darling Basin Authority, DCCEEW - Commonwealth Env. Water Holder, NSW DPI - Fisheries, WaterNSW, NSW Biodiversity Conservation Trust, NSW DCCEEW</p>
ARDC investment	Proposed: \$1m over two years

Problem statement

Gayini contains dynamic and interconnected ecosystems and a range of government and non-government organisations are collecting data on the lands and water for research and decision-making purposes. Gayini is owned by the Nari Nari Tribal Council (NNTC), an Aboriginal-led not-for-profit organisation. NNTC manages Gayini with a consortium of partners including Murray Darling Wetlands Working Group, The Nature Conservancy Australia and the UNSW Centre for Ecosystem Science, with the aim of protecting and restoring the landscape and Aboriginal Cultural Heritage values, and creating sustainable economic value. A Strategic Adaptive Management Plan has been developed to guide activities over the next 10 years.

The consortium and their funding agencies require a trusted environmental data and information supply chain that enables them to manage, visualise and use reliable environmental data and information to manage Gayini, demonstrate the impact of management activities, and further research outcomes.

A co-design workshop was held online on 25 June 2024, with 39 participants representing the majority of stakeholders with interest in environmental outcomes for Gayini, either as data generators, users or related data service providers. The main data challenges identified by the partners included:

- Providing streamlined access to scientific data so it can easily be combined or interpreted alongside Cultural Knowledge and Indigenous Data, particularly in the areas of fire, water and grazing histories, and native foods and botanicals enterprise
- Understanding ecosystem changes and drivers (over time and space)
- Access to timely, fit-for-purpose data for decision-making, management actions and reporting.

Outcomes and key outputs

A trusted environmental data and information supply chain for Gayini will enable a partnership between regional stakeholders that brings together existing data from diverse sources effectively for the realisation of the 2023 Strategic Adaptive Management Framework vision for Gayini: ‘Nature at Gayini thrives, and the traditional peoples of Gayini heal its land and waters’.

It will provide a comprehensive regional view of data collection efforts and the availability of trusted data, models and information products, enabling more efficient and effective research into regional ecosystem processes, management effectiveness, and trends. Potential research use cases include:

- Ongoing monitoring of vegetation condition through a combination of vegetation condition assessments, floristic surveys and remote sensing data, to inform strategic adaptive management and reporting on vegetation conservation objectives.
- Examining the impacts of livestock grazing regimes on vegetation communities to inform strategic adaptive management of wetlands and other ecosystems, and understanding the interaction of grazing regimes with floods, fires and climate.
- Understanding fish, frog and waterbird seasonal abundance across Gayini, their interactions, and the impact of factors including native and invasive species, flooding regimes, including environmental flows and water infrastructure.
- Design of informative indicators of the trajectories of change for terrestrial and freshwater ecosystems for assessments of risk of collapse and recovery of ecosystem condition.

The NNTC will have access to data-driven decision support and streamlined reporting tools to manage the lands and waters of Gayini effectively. Metadata will support the evaluation of data and models as accessible, fit-for-purpose, trustworthy, and reusable by clearly describing the rights of data owners, the provenance of data and information products, and the context around the data.

The Gayini trusted data and information supply chain project will develop enduring infrastructure that enables data search, discovery and reuse of trusted data across multiple providers for key indicators of environmental condition over time and space for multiple attributes of water and land. This project will comprise the following outputs, which will be capable of generic application to other landscapes:

- A governance and business model for the long-term operation of the TEDISC
- A data governance framework that allows for data and model sharing between all involved organisations, with appropriate access controls
- A documented data publishing pipeline that covers agreed best practices for Trusted Data and Information Supply Chains (data, metadata, vocabularies, data exchange, quality, provenance, and trusted repositories)
- A federated technical infrastructure that provides:
 - A discovery layer that enables access to relevant data and models from distributed sources, with appropriate access controls
 - Visualisation of spatio-temporal data
 - Reporting applications
 - Connections to existing analysis and modelling infrastructure

- Training of data providers and end-users

Proposed Description of work packages

■ Workstream 1 - Project management and governance

- Project tracking and reporting, recruitment, communications and engagement

■ Workstream 2 - Data

● WP 2.1 - Data Governance and Information Standards

- Audit of relevant data from data providers, including access method and rights
- Data governance framework to enable the sharing of data across partners
- Policy and process documentation to support the operation of the Gayini TEDISC (such as minimum information standards requirements for contributing data, including PIDs, vocabularies, quality and provenance).
- Documented and published data architecture

● WP 2.2 - Data engineering

- Standardisation of data and data provision at partner sources
- Creation of metadata for users to be able to evaluate the data they discover as reusable and fit-for-purpose (leveraging standard metadata schema and vocabularies)
- Data ingestion into platform

■ Workstream 3 - Platform

● WP 3.1 - Platform Frameworks

- User requirements gathering
- Access and identity framework, leveraging ARDC Identity and Access Management services
- Evaluation of potential technical solutions and vendors (e.g. SEAF, Eratos, etc)
- Documented systems architecture

● WP 3.2 - Platform Engineering

- Deploying the technical infrastructure required to provide:
 - Spatial search, discovery and visualisation of Gayini data holdings across data providers
 - Data applications - these will be prioritised to meet user needs, such as reporting dashboards, data analysis pipelines or connections to existing modelling and analysis infrastructure (e.g. EcoCommons)

■ Workstream 4 - Skills and Training

● WP 4.1 - Training data contributors and end-users to contribute to and use the system

- WP 4.2 - Enhancing the capability of researchers and managers to reuse data, through a secondary data use framework and training materials, including showcasing real world data re-use scenarios.