# Climate Change Adaptation Research Grants Program
## - Terrestrial Biodiversity Projects

**Project title:**
Adapted future landscapes – from aspiration to implementation.

**Principal investigators:**        Professor Wayne Meyer
**Lead organisation:**           University of Adelaide

**Objectives**:
We plan to capitalise on the projections made by Landscape Futures Analysis that illustrates that regional adaptation to climate, market and social changes is possible by changing what we do where on the land. Local and regional productivity and conservation goals and social aspirations can be achieved by farming to land capability, changing land use to capitalise on the emerging carbon market and identifying practices that give a mosaic of production and conservation with benefits for multiple ecosystems services. It is possible to make estimates of the costs and foregone returns for such transformations. Within this there is real and perceived risk. The challenge of this project that explicitly addresses "integrated landscape adaptation to climate change risks, impacts and opportunities" is to identify and test an implementation process that sees individuals, localities and regions take the projections together with a considered assessment of the risks of change and embed them into their planning processes. If this is achieved then integrated landscape adaptation that is evidence informed will have begun.

The development of Landscape Futures Analysis has been in close collaboration with the Eyre Peninsula and SA Murray Darling Basin Natural Resources Management Board. While the Boards are very interested in the process and results they remain unsure about how to fully exploit the projections in planning and implementation. Both regions will begin to develop new 5 year plans in 2012. This planning will be coincident with this project. In collaboration with these two regions we will develop and use an engagement and planning process that is informed by local experience and documented resilience planning from other Australian NRM regions. We will use already created datasets to develop a suite of landscape futures based on the LFA approach, local experience under the restrictions of limited NRM resources and a changing climate. Analysis of multiple futures will illustrate the potential interplay between land uses, highlighting and providing economic evidence about their synergies and conflicts and informing our consortia of the major barriers and opportunities to climate change adaptation in specific areas of the regions. To encourage the interaction between researchers and NRM planners, we will develop software that interfaces between the datasets and the effect of different policy options on land use and the resultant economic, environmental and social indicators and ecosystem services. The software will have ongoing value for the regional planners as base data is updated and new policy options are explored.

The lessons learned from the engagement and planning process within each region will be generalised to provide a guidebook for planning with LFA that can be adapted for other  regions.

**Project design and methods**

***Part 1*** of the project will focus on engagement with the NRM regions to better understand and document their planning and policy development processes, refine the existing LFA datasets and reach agreement on an experimental planning process. We will form a project team that will include nominated planning stall from the regions, a contracted facilitator with regional engagement experience to guide and assist shaping the interactions and an organisational sociologist to provide insights into what processes and information will make this a successful implementation process. The researchers involved will gather datasets from the previous two projects, the "Lower Murray Landscape Futures" and the "Climate Change Communities and Environment" to give evidence on the current landscape design, the effect on biodiversity and production systems from a variety of climate change projections and the spatial distribution of potential alternative land uses calculated under the

same scenarios. With respect to issues of water management and aquatic biodiversity in the SA MOB NRM Region, the existing analysis of water allocation, wetland management and irrigation options from the Lower Murray Landscape Futures will be updated with more recent analysis from the "Murray Futures" state agency project. Mr Michael Cutting, Land and Water project manager from the MOB Board will be part of the project team. For the EP NRM the most important water management issues are around the sustainable yield of the southern groundwater aquifers. There is much recent work that needs to be interpreted using similar climate change scenarios as applied in the terrestrial analysis. Mr Jonathon Clark. EP NRM Board, Manager Water Resources will be part of the project team.

Where needed, these datasets will be updated to reflect state of the art science and other alternative options that might be highlighted early in the project as possibilities for regional adoption. We will meet with local NRM planners in both regions in face-to-face and workshop formats to discuss and investigate how the LFA could fit in with their planning process. The outcomes of these meetings will inform such question as; does the NRM planning process benefit from a LFA approach? What datasets are needed to help redefine priorities? What flexibility and control is needed in the interactive software? How much training will be required for standalone implementation and use by the region after the project is completed? The outputs from the updating or creating new landscape datasets and the meetings with NRM personnel will be documented in Report 1 of the project.

*Part 2* is the creation of the software which allows the NRM planners to explore the implications of future climate change based on the LFA datasets. The software will interface between the optimisation and policy option assessment model components and LFA datasets. This software will enable the end users to manipulate the optimisation and assessment process without the need for training in the specific models and a thorough understanding of the LFA datasets. The software will be flexible enough for the user to change parameter values and to analyse the possible trade-oils involved in the creation of landscape futures. The software will allow investigations of different visions for the region and to focus on specific geographic areas or land uses for more detailed understanding of the trade-oils involved for climate change adaptation.

*Part 3* begins the road test of the experimental planning process. It will use the concepts of LFA to produce regional landscape futures and a sensitivity analysis approach to identify what impacts are possible, what options are feasible and quantify these possible changes under a variety of climate change scenarios. The software created in part 2 will allow the regional policy developers to investigate alternative futures and analyse opportunities for multiple benefits such as remnant refugia, financial returns from carbon planting and connecting corridors while trying to minimise the economic impact on the agricultural sector at local through to regional scale. The sensitivity approach incorporating the LFA concept will illustrate the fundamental principles and practices that will give the best chance for successful climate change adaptation. The development of regional futures will be a critical sounding board for NRM planning in the consultation phases of both regions' strategic plans. We expect this to facilitate and encourage discussion between State agency, NRM Board, NRM planners and regional community.

*Part 4* involves reflection of the learning experiences of both NRM personnel and researchers into the use of LFA in the NRM planning process for climate change adaptation. We will reflect on whether the framework, software and landscape futures approach was successful highlighting flaws, benefits and future directions. A guidebook will be created summarising a comprehensive planning approach that draws on the most recent Australian experiences together with LFA that provides the quantitative evidence base. We expect that this experience can be applied to other regions to become climate change ready.