

Australian Collaborative Land Evaluation Program 2009 - 2010 final milestone report

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for
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1. THE AUSTRALIAN COLLABORATIVE LAND EVALUATION PROGRAM

The Australian Collaborative Land Evaluation Program (ACLEP) is a proven model for national cooperation and collaboration. It provides a focus for the collection, collation, management, dissemination and analysis of nationally consistent, integrated data and information on soil and land resources.

ACLEP delivers on a vision that “natural resource management in Australia is underpinned by appropriate soil and land resource information and knowledge to ensure sustainable economic and environmental systems”.

ACLEP is funded by CSIRO and the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF), with strategic direction from the National Committee on Soil and Terrain (NCST). States and territories provide significant resources in support of ACLEP projects and activities.

For more information on ACLEP visit the program website at <http://www.clw.csiro.au/aclep/>

2. FUNDING DEED FOR 2009 - 2010

Negotiation between CSIRO and DAFF for ACLEP funding began in March 2009. At this time, a longer term program agreement was envisaged, with draft milestones being developed for a four year period between June 2009 to July 2013. General agreement to the 4 year proposal was reached in December 2009. However, due to contracting complexities and a need to secure funding for the current 2009/10 financial year a one year funding deed for 2009/10 was developed.

The “Funding Deed for the Australian Collaborative Land Evaluation Program” (2009 - 2010) dated 26th March 2010 was fully executed and exchanged on 6th April 2010. Contract negotiations are progressing for the remaining 2010 - 2013 period.

2.1 Milestone deliverables

The Funding Deed establishes a number of milestone and key performance indicators (Schedule 2 see Appendix A) based on a set of deliverables. Approximate funding level for each of the key activity areas is also shown in Appendix A.

This report is the basis of the second milestone and provides a “Draft annual report on workplan activity”.

A number of the ACLEP milestones and deliverables are not finalised as these require sub-contracts with state agency and consultant service providers which are now being finalised. Many core ACLEP activities undertaken largely within CSIRO have achieved considerable progress.

The status of activity related to each of the ACLEP milestone and key performance indicators is presented in the following sections under the headings of the ACLEP key activity areas.

3. COORDINATION AND PARTNERSHIPS

3.1 Review of key clients, data needs availability and gaps

This activity aims to ensure that the data and information products delivered by ACLEP through the Australian Soil Resource Information System (ASRIS - see <http://www.asris.csiro.au/>) are tailored to meet the needs and expectations of key clients and users.

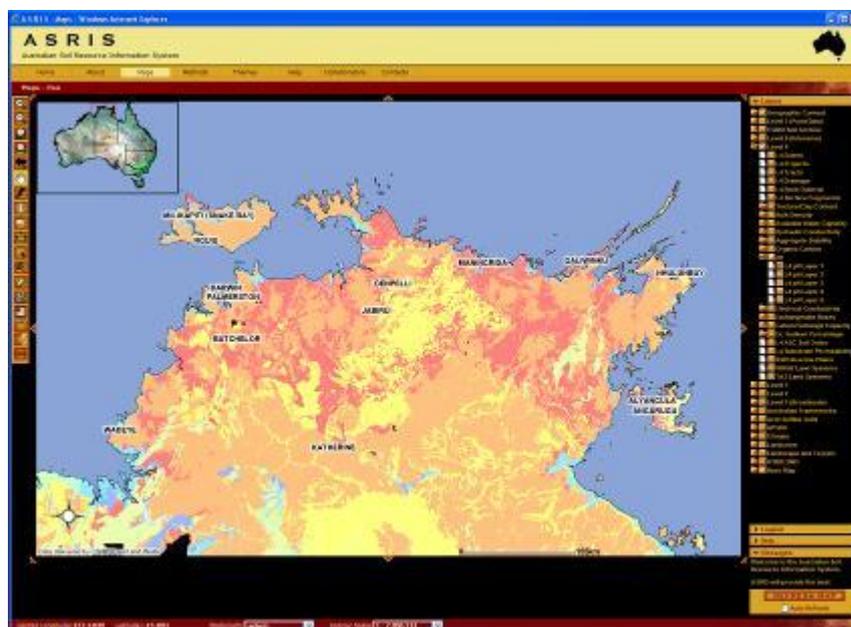


Figure 1 ASRIS web mapping interface showing surface pH data

To date ASRIS has largely provided a web based view of some of the fundamental soils data developed and maintained within the ASRIS data base. Limited data is available for download (broad scale Atlas of Australian Soil and APSRU crop model site characterisation input files being the main exceptions) due to both the complex nature of the ASRIS data model and the restrictions placed on access largely by state agency data owners.

The ACLEP/ASRIS management team receives regular correspondence requesting access to ASRIS data for a wide range of uses by a wide range of clients. Replying to these requests is a time consuming activity and generally results in the requesting party being re-directed to relevant state agency data custodians. This results in duplication of effort in responding to the request and often a poor experience for users who can see the data they want but have to negotiate a lengthy process to obtain it.

Many users do not need or understand the complexity of the ASRIS 5 layer, multi-component data model and discussing the specific needs of users is another time consuming, though important process. Potential users often request a consolidated or interpreted ASRIS product, rather than the ‘raw’ ASRIS data. A number of ‘summary’ data products have recently been created for specific project activities (such as establishing soil condition monitoring, Caring for Our Country investment prioritisation and a northern Australia agricultural suitability assessment).

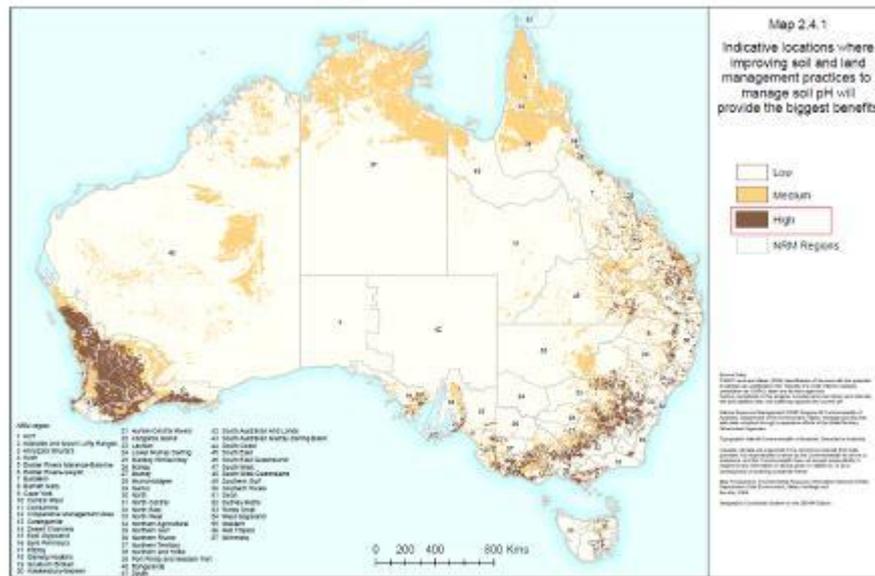


Figure 2 ASRIS Soil pH input to Caring for Our Country Business Plan see <http://www.nrm.gov.au/business-plan/10-11/maps.html>

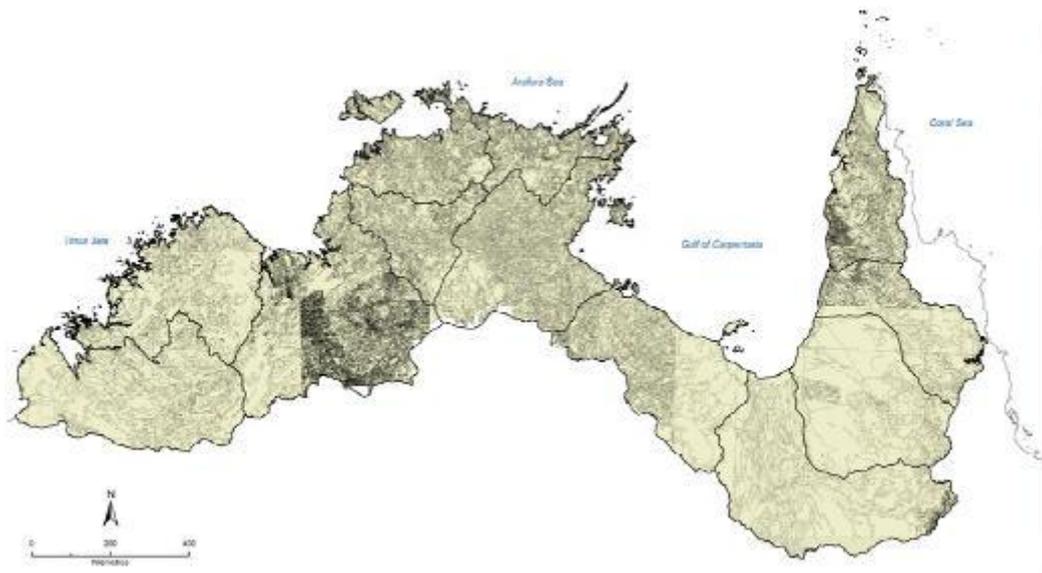


Figure 3 ASRIS data used for the northern Australia agricultural suitability assessment see http://www.nalwt.gov.au/science_review.aspx

Discussions have commenced with the National Committee on Soil and Terrain (NCST) regarding the value in making such products available as ASRIS downloads. It is hoped that a number of 250m grid/raster products can be agreed on and made available by December 2010 as a first set of national ASRIS data deliverables.

To improve the value and utility of ASRIS data in the future, a targeted review of key clients and users is being planned. Negotiations have commenced with Auricht Projects (Chris Auricht and Blair Wood) to undertake the assessment and an initial kick-off meeting was held in May with project completion and reporting planned for the end of September 2010. The assessment will identify specific soil data and information needs of modellers (water, cropping, biodiversity etc), research providers, agricultural industry, decision- and policy-makers and to a lesser extent, broader education and community sectors.

3.2 Status of soils data infrastructure governance and licensing

As discussed above, the national ASRIS data collated and maintained by CSIRO is largely considered the intellectual property of the contributing agencies and cannot be freely distributed to third party users. While this may be the case for some of the component data sets there are also considerable amounts of the data that have been provided under less restrictive data licensing arrangements. Also, many of the data have been historically collected with financial support through Australian Government funding programs. Such programs often had contractual allowance for the provision to, use by and sub-licensing of data by the Australian Government.

The situation at present is that the specific license conditions which attach to a particular record of ASRIS data cannot easily be determined. No register of the individual license conditions exists and data have been provided to the central ASRIS repository over a number of years, under different conditions and varying degrees documentation. Determining and applying specific license conditions is unrealistic. A “gentlemen’s” agreement therefore exists between the ASRIS management team and the members of the NCST that state/territory agency data (and to a large extent any information product derived from them) will not be made available to third party users through the ASRIS web interface.

The proposed 250m grid products discussed in the section above are an attempt to overcome some of the current licensing restrictions and issues. These proposed data will be representations of the ASRIS data that has been generalised to a degree and will not be able to be de-constructed to the original source data and should not therefore breach any licensing conditions. It is proposed that these data products be made available for download using Creative Commons Attribution (CC-BY) licensing (see <http://www.creativecommons.org.au/licences>), which allows used of the data for any purpose with the simple requirement of acknowledging the source of the data. This source will be a general attribution to ASRIS and ACLEP which by inference will acknowledge all the individual contributing agencies. Discussion on this proposal is planned for the NCST meeting in June 2010.

As a longer term solution to the licensing dilemmas of ASRIS, it is recommended that an approach be made to all the individual state/territory contributing agencies through the NCST seeking their written approval for the release of all data from ASRIS to third parties. It is hoped that a case can be made to recognise the untenable nature of current licensing confusion and to acknowledge the collaborative government funding and public good nature of soils data and information. Therefore all data should be made freely and publically available for no cost through digital download. A letter of agreement from an appropriate level of each government may be required to facilitate this and CSIRO could engage with states to facilitate this outcome for ACLEP.

4. PROMOTE STANDARDS AND GUIDELINES

One of the strengths of the ACLEP process is the creation, promotion and implementation of national standards and guidelines for the collection, collation and presentation of soils data. See <http://www.clw.csiro.au/aclep/publications/handbooks.htm>.



Figure 4 ACLEP website links to published standards and guidelines

The current focus for ACLEP has been on ways to improve the processes for national collation of consistent soils data for Australia.

4.1 Improving ASRIS technical specifications and data collation

The ASRIS Technical Specifications Version 1.5 October 2005 (McKenzie et al.) provides the basis for national data collation. Whilst most contributing agencies provide data with a high degree of compliance to the specifications, the process and methods by which data is provided

is both varied and time consuming. A major ASRIS data provision project last year included considerable time and effort from ASRIS technical staff to import data sets. This was largely due to the plethora of data formats which were provided and the lack of easily applied validation processes to trap and fix significant data errors. The resulting process required considerable manual intervention and repeat data supplies from a number of agencies.

It is not possible, nor desirable, to implement the same data base application and data schemas in each contributing agency. The preferred approach is to develop a community agreed information model which explicitly defines the features of interest, their relationship with each other and the vocabularies used to describe them. Such an information model is commonly expressed in Unified Modelling Language (UML) with XML being used to support data transfer. This is a relatively new approach in the soils community and development of understanding and skills in this area is progressing.

ASRIS staff were represented at a GlobalSoilMap.net information modelling workshop held in Wageningen, The Netherlands in late 2009. This was an opportunity to align Australian national approaches to soil information modelling with global efforts. The workshop developed a first draft conceptual soil information model which considered a broad scope covering legacy soil data (site and mapped) as well as potential *GlobalSoilMap.net* raster/grid based data products (see <http://www.globalsoilmap.net/>). Australia’s contribution to this workshop was significant and there was agreement that CSIRO staff, through the Oceania Node of *GlobalSoilMap.net* would take initial carriage of further information modelling activities.

A subsequent meeting of the Oceania Node was held in Canberra in March 2010 with representatives from CSIRO, Sydney University, NZ and invited observers though the NCST from the Queensland, Western Australia and Victoria. The meeting developed a first draft GlobalSoilMap information model focussing on specific data and information deliverables defined in the GlobalSoilMap Specification (V1.0).

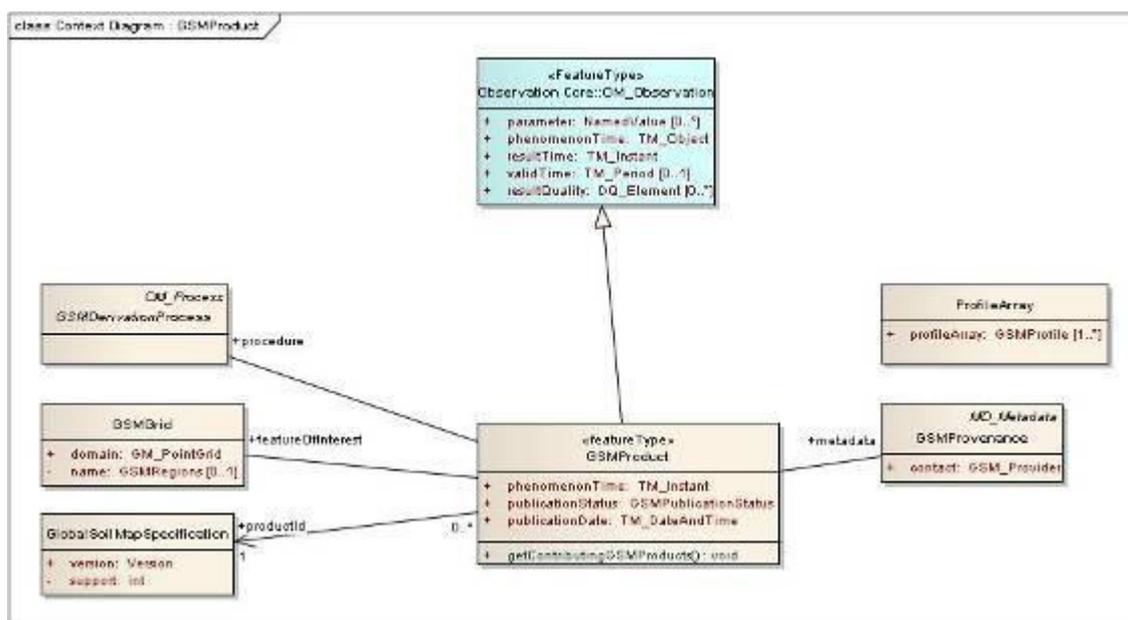


Figure 5 UML class diagram of part of the draft GlobalSoilMap information model

GlobalSoilMap.net products are essentially fine resolution (nominally 90m) grid/raster or point array data representing either a defined depth interval or parameters for a continuous depth spline of a number of agreed soil properties. The further development of the GlobalSoilMap information model was presented and discussed in a series of technical meetings held by *GlobalSoilMap.net* in Rome in late May 2010.

The ACLEP team has undertaken some initial development using existing ASRIS data to test a process and to create a *GlobalSoilMap.net* compliant data set. A number of issues regarding data format, file size, spline implementation and other technical considerations have been reported to *GlobalSoilmap.net* and the ACLEP team is taking a lead in progressing an international implementation trial of GlobalSoilMap data transfer, collation and visualisation to be run over the next 6-12 months.

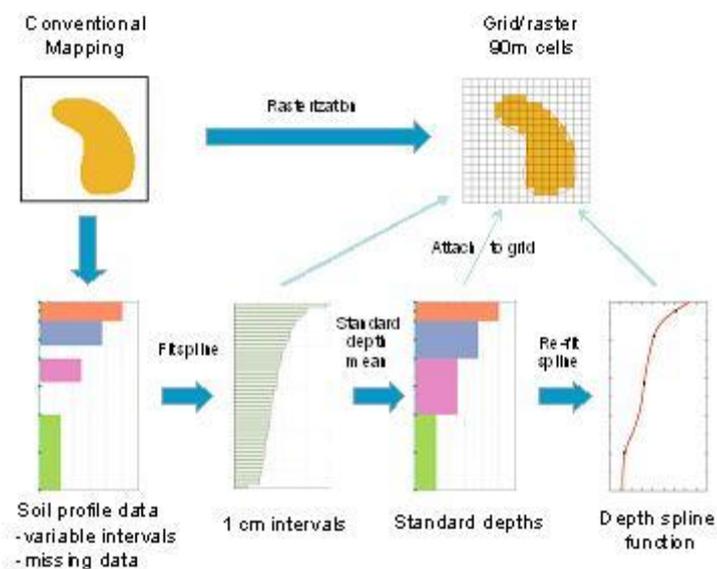


Figure6 Process for creating a GlobalSoilMap compliant raster data set from existing ASRIS maps

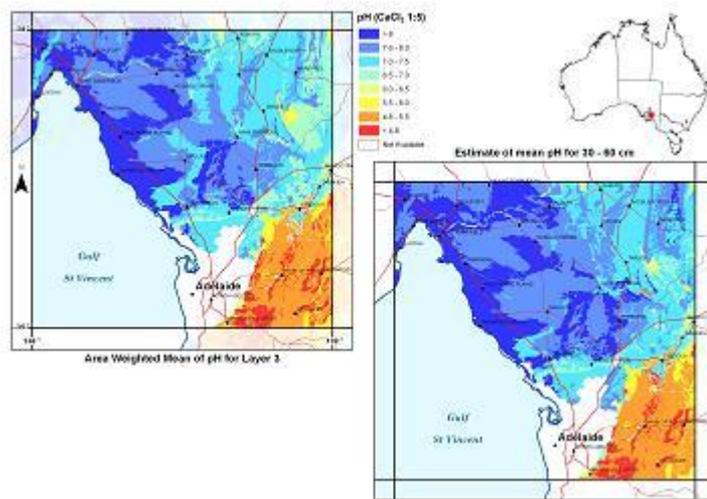


Figure 6 Example GlobalSoilMap 30-60cm depth slice raster (right) compared to ASRIS Layer 3 data (left)

The future implementation of the GlobalSoilMap information model in Australia will support progress towards development of site, map, and grid soil information models for Australia. The progress of digital soil mapping techniques and creation of fine scale prediction surfaces of soil properties in Australia will require ongoing development, testing and implementation of these information models.

5. DELIVERING ASRIS

The ongoing delivery of the national ASRIS data base and the interactive web pages and mapping tool is a core function of ACLEP (see <http://www.asris.csiro.au/>). Considerable time and resources are allocated to this activity to ensure access to the best available data and information.

5.1 ASRIS management and development

The ASRIS suite of products includes the technical specifications, the national ASRIS data bases (sites, mapped polygons and contextual layers), delivery of the web interface and provision and use of data and GIS analyses for national assessments. A number of improvements have been made to ASRIS throughout this phase of ACLEP including -

- initial development and testing of ARCServer technology for replacement of current Arc web software which will not be supported in the future. This requires significant skills development and processing of existing ASRIS data. It is expected to provide greater flexibility and efficiency in data visualisation and online query and has been successfully deployed in a test environment to support soil condition monitoring project activity
- commenced replacement of dedicated ASRIS hardware with a new multi-processor server capable of increased processing to cope with high volume files expected when moving to future high resolution grid data models
- amendments to visualisation of the National Acid Sulfate Soil data layer and continued discussion with NCST on presentation of data sets through the ASRIS web interface.

5.2 Improving ASRIS linkages

ASRIS provides a focus for soil data and information, particularly related to characterisation and mapping of soils and description of soil properties. It also provides a link to many related soil data sets and activities which are not specifically part of the ACLEP work program. Recent improvement in these links include -

- updates to APSRU data files through the “crop modelling” link and availability of APSRU characterisation site data through Google Earth
- Atlas of Australian Soil has been added as a new ASRIS theme. This theme contains downloads of the Digital Atlas of Australian Soils, attribute look-up tables, metadata, and explanatory notes <http://www.apsru.gov.au/>.

- involvement in a GRDC project for making better fertiliser decisions in the cropping industry. Discussions are continuing on the future linkage of data and products within ASRIS, similar to the dairy industry nutrient management theme pages.

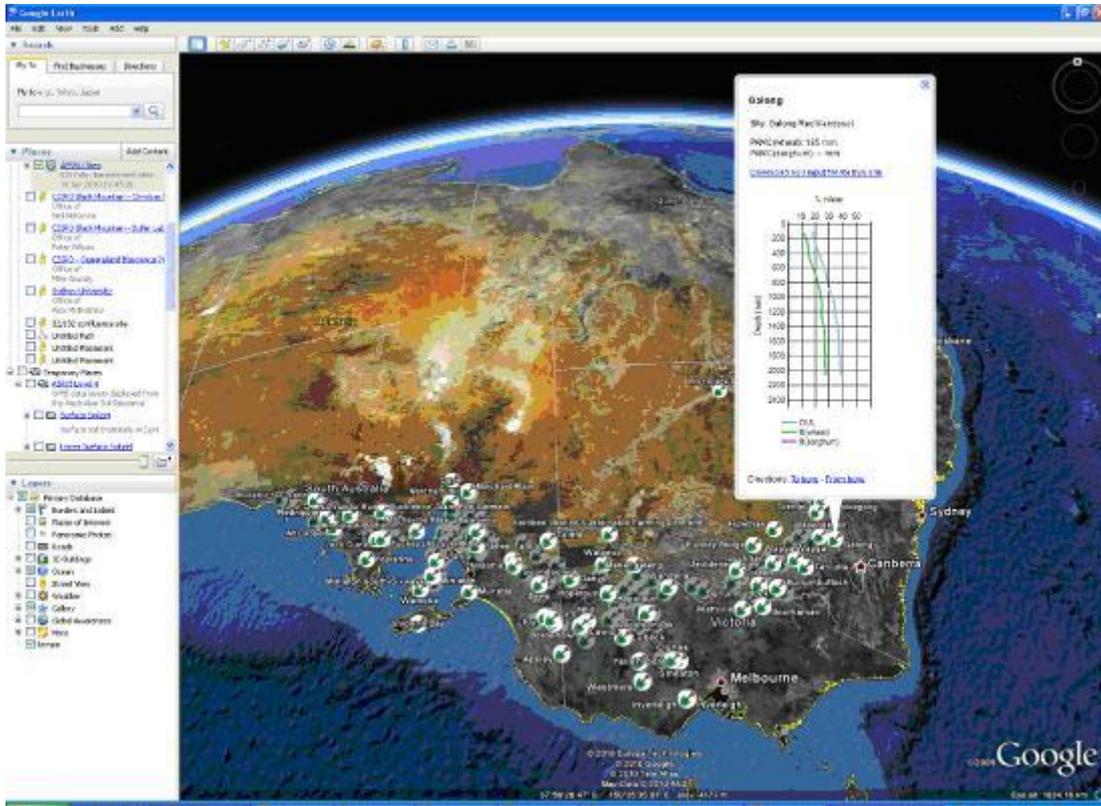


Figure 7 ASRIS data for APSRU crop modelling displayed in Google Earth

6. ASRIS DATA UPLOADS

6.1 Capturing additional historic data in ASRIS

Much of the available digital mapped soils data has now been captured from many state agencies. Significant holes exist within the national coverage, particularly for New South Wales and Victoria and discussion with custodians for future provision of data into ASRIS have been initiated although no clear proposals have eventuated.

Remaining data sets for the Northern Territory and Tasmania are known to exist and there is a willingness from these states to continue provision of data into ASRIS. A project proposal and contract for the provision of NT data from the Barkly Tableland and the Victoria River District is currently being finalised, with data delivery expected early in the second half of 2010. A similar proposal and contract for south-east Tasmanian data is also progressing with likely delivery of data in October 2010.

7. DIGITAL SOIL MAPPING

This is a significant research and development area for ACLEP. It is aimed at developing and trialling methods for rapid production of high quality, high resolution predictions of key soil attributes.

7.1 Assessing techniques and data availability

Digital soil mapping (DSM) can take many forms and a number of recent ACLEP discussions have been aimed at sharing experiences and processes between key scientific research groups in this area. The broad spectrum of digital soil mapping activities includes improvements in use and access of data sets, development of better soil landscape models and model-data fusion processes, investigation and application of geo-statistical and stochastic simulation modelling and development of new and improved technologies for remote and proximal sensing. ACLEP project activity in digital soil mapping has been working in many of these research areas to varying degrees.

The incorporation of new data sets, such as national gamma-radiometrics from GeoScience Australia, or Shuttle Radar digital elevation model products and derivatives will be a key to improved modelling of soil and landscape attributes. Access to gamma-radiometrics data sets has been supported by GeoScience Australia. Images of some national radiometrics layers have been incorporated within the ASRIS web interface, showing the potential of these data for supporting prediction of soil attributes. The radiometrics data has also been used in national soil attribute prediction modelling by Raphael Viscarra Rossel in conjunction with NIR and MIR spectra of soil samples. These initial national products will form the basis of proposed state/regional based validation and improvement projects proposed for the near future, as discussed below.

ACLEP is engaging with key CSIRO staff involved in producing clean digital elevation model products from the NASA Shuttle radar mission. DEM and associated terrain derivatives are essential inputs into models predicting soil and landscape attributes. ACLEP will fund the production of national terrain derivative products for release through ASRIS in the near future, following the finalisation of work on the base DEM.

Other digital soil mapping activities are considering methods for improved and rapid proximal sensing of soils, such as NIR/MIR scanning. Near Infra Red (NIR) scanning of a large set of archived soil samples from around the country has been completed and the sub-samples are now being prepared for Mid Infra Red (MIR) scanning which requires a considerable amount of pre-processing. Some delays in MIR scanning have also resulted from temporary relocation of staff from the CSIRO Butler Laboratory for emergency building renovations and resultant limited access to MIR equipment. Time has been spent improving the long-term storage of archive sub-samples and this will assist future scanning preparation activity.

The development of the 'Earth Rover' for rapid and intense field sampling with a range of proximal sensors is progressing well and field testing of equipment is nearing completion. Initial analysis of data shows promising results for site/field resolution predictions of some key

attributes. Once testing is complete it is hoped that the Earth Rover will be available to be used in proposed ACLEP DSM state based projects discussed below.

7.2 Funding proposal for strategic national DSM projects

Following the further development of tools and techniques for digital soil mapping, ACLEP proposed to begin compiling options for possible funding of a national strategic data acquisition project. This was originally in anticipation of funding possibly becoming available for monitoring of program outcomes or through the implementation of a National Environmental Information System (see <http://www.environment.gov.au/npei/index.html>). Such a program of investment would provide key data sets to support digital soil mapping and prediction of key soil attributes in priority areas.

The digital soil mapping project activity discussed in section 7.1, however is not sufficiently mature to allow any detailed analysis of priority data needs and gaps. It is hoped that once national prediction surfaces have been validated and improved at state and regional levels, through future proposed ACLEP project activity, that an assessment will be able to determine which data sets are key covariate predictors for which soil attributes. It is unlikely that such an assessment could be undertaken for 12 to 18 months and is anticipated for future ACLEP activity under the long term project outline.

7.3 DSM state based projects

ACLEP is currently negotiating two state based projects to further explore the application of digital soil mapping at state and regional levels. These projects will aim to give initial validation of national soil attribute products being developed by Raphael Viscarra Rossel through incorporation of additional state based data and local knowledge. National products will be improved for the particular states and learning's applied to the full national data sets. In addition the proposed projects will test the validity of the improved national products at regional and local level and seek to further improve predictions for regional conditions. It is anticipated that the Earth Rover and other proximal sensing techniques will be able to be applied to specified regional areas with the aim of increasing the data inputs to soil attribute prediction models in these areas.

Through the NCST, the Northern Territory and Tasmania have been identified as potential collaborators in state based projects and initial project briefs and contracts have been developed and have gained initial support from relevant agencies. However, it has not been possible to fully develop specific project objectives, milestones and timelines and initial plans for commencement of activity by the end of June will be delayed some months. A number of state agency personnel were supported by CSIRO, through the NCST, to attend the 4th global workshop on digital soil mapping in Rome, Italy in May 2010. This provided an opportunity for discussion on the proposed project activity and we are now in a much better position to progress project proposals following that meeting. In addition, state agency personnel and NCST members will be meeting in Canberra in late June for an ACLEP workshop on digital soil mapping (see further details below) and this will again provide an opportunity for further progressing these planned projects.

8. THE NATIONAL SOIL ARCHIVE

ACLEP supports the ongoing management and development of the CSIRO National Soil Archive, a collection of physical soil material samples and associated analytical results from around Australia.

8.1 Archive operations

The Archive is now widely recognised as a national facility and is an increasingly important component of many soil related initiatives (such as national soil carbon assessments and proposed national soil condition monitoring).

With increasing interest in the use of the Archive there has been a need to formalise processes and procedures, particularly for submission and use of samples. An Archive management committee and operational guidelines have been established to provide a balanced decision making process and relieve responsibility from individual technical staff. Regular meetings have been held to consider proposals for submission and use of Archive material. A number of proposals for submission of material to the Archive are being prepared by Queensland and Northern Territory governments and other research organisations. A new website for the National Soil Archive will be released soon as part of the ACLEP website following final clearance processes.



Soil specimens before archiving



Soil specimens after archiving

Staff are working hard to increase the number of samples within the Archive although the backlog of submitted samples is increasing (e.g. 5 pallets of soils have arrived from WA and another recently from Tasmania). Figure 10 below shows the current status of archived and un-archived samples. The graph shows a steady increase in samples being submitted to the Archive. Also while the number of fully archived samples continues to grow, the rate of archiving has slowed in the last year due to the introduction of additional sub-sampling processes as discussed in 8.2 below.

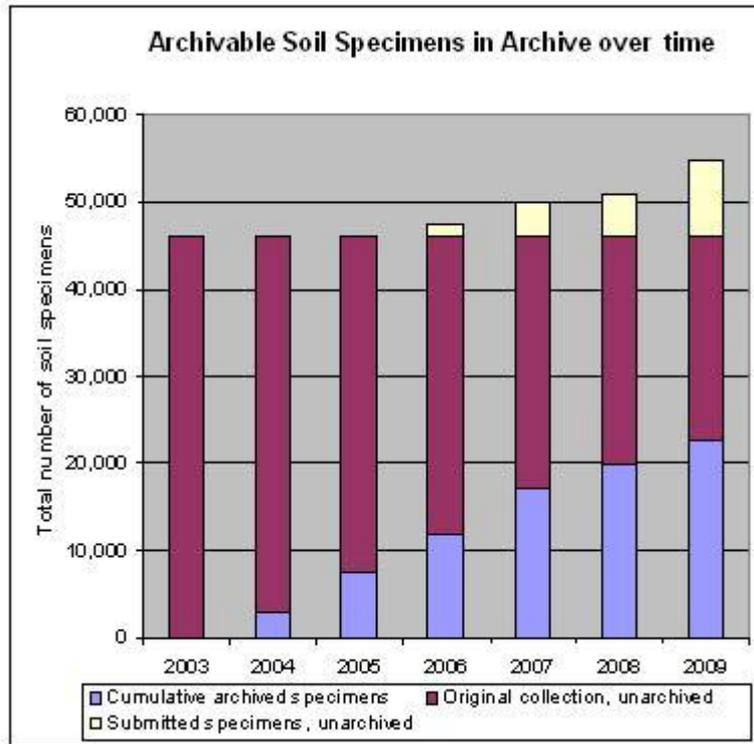


Figure 9- Status of samples in the CSIRO National Soil Archive, April 2010

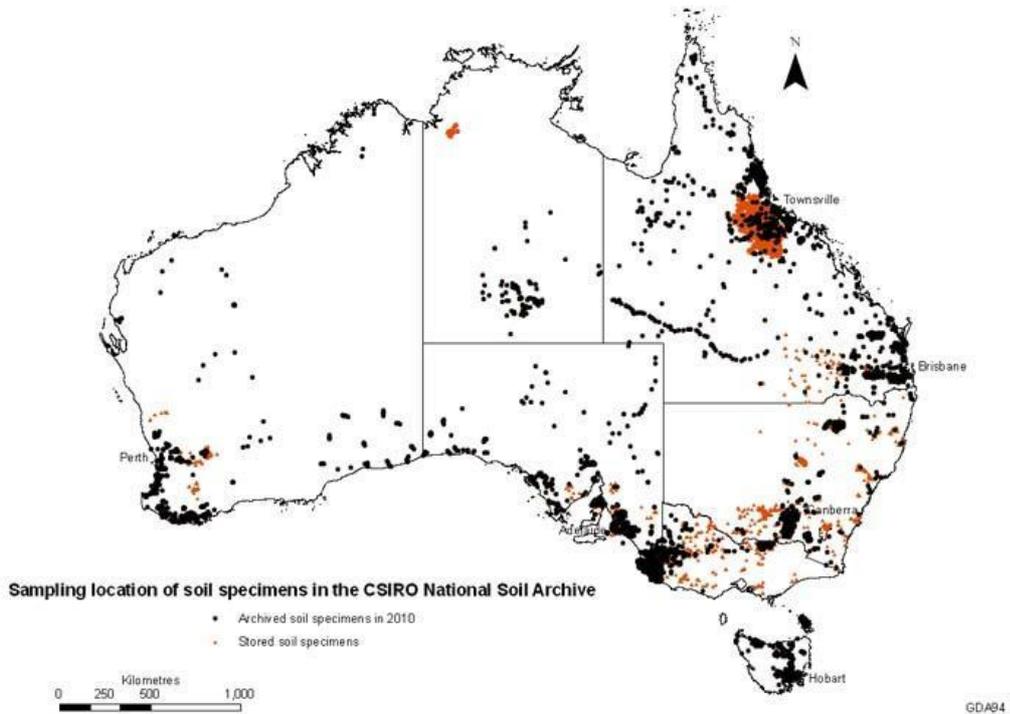


Figure 10 Location of soil specimens in the National Soil Archive

8.2 Improving Archive procedures to support NIR/MIR scanning

The process of archiving has also become more complex and time consuming with the need to sub-sample all new material for future spectral analysis. The process has been refined to allow archive labelling and more secure and long-term storage of the sub-samples. It was hoped that sub-samples could be scanned with NIR and MIR spectrometers as part of the archiving process however the time required to prepare samples (grinding etc) particularly for MIR scanning prohibits this. A separate process for scanning sub-samples will be initiated but requires significant technical assistant time input.

9. NATIONAL REPORTING

Limited resources are available in the ACLEP workplan to support strategic and tactical national reports related to priority and emerging soil issues.

9.1 Phosphorus nutrient management in Australia

It is proposed to develop a report on the current trends and implications of phosphorus management in Australia. Reliance on nutrient inputs and predicted needs to increase total factor productivity of agriculture, coupled with probable future decline in availability of phosphorus make this a potent issue of interest to many sectors.

Discussions within CSIRO have identified key research staff and present activity related to this topic. A meeting has also been held with the Meat and Livestock Authority that is conducting similar assessments related to the grazing industry. Collaboration with the MLA project will enable consideration of similar issues across the broader agricultural sector.

10. ACLEP COMMUNICATIONS AND PROMOTION

10.1 ACLEP web site

The ACLEP web site has undergone significant improvements and updates to include current project activity and related outputs - including links to Atlas of Australian Soil data, the 19th World Congress of Soil Science, the soils of southern Australia, managing Australia's soils policy discussion paper consultation outcomes and *GlobalSoilMap.net*. Contacts for the National Committee on Soil and Terrain have been updated.



Figure 11 Home page of the new look ACLEP website

The look and feel of the website has been modernised and a new logo for ACLEP has been designed and implemented.

Content for regular updates to the website is always difficult to source and limited time and resources are available to prepare information and maintain the website. It is hoped that an ACLEP communications position can be filled in the near future to assist with this activity. Better links to NCST activity and increased member input to the ACLEP website will be encouraged.

10.2 ACLEP communication strategy

A key deliverable is an ACLEP communications strategy which will identify key clients and messages and recommendations to improve promotion and communication for ACLEP and soil related issues. Through implementation of such a strategy, ACLEP will become a recognised 'brand' and be acknowledged as the national focal point for Australian soil data and information.

Discussions have been held with CSIRO communications staff regarding approaches to developing an ACLEP communications strategy. A short term casual position has been filled and development of the strategy is underway. A draft will be discussed with the National Committee on Soil and Terrain at its June 2010 meeting and finalisation of the strategy is anticipated over the next few months.

A range of ACLEP related promotional material is being discussed and developed to establish ACLEP as a well recognised and trusted 'brand' for Australian soil information. Material will

be made available for the 19th World Congress of Soil Science being held in Brisbane in August 2010.

11. SKILLS AND CAPACITY BUILDING

ACLEP provides an opportunity for national collaboration and sharing of research and development. Limited resources have been allocated to support a national training or skills sharing activity at least once a year.

11.1 National Digital Soil Mapping Workshop

ACLEP will host a national digital soils mapping workshop in Canberra on 22nd June 2010, in conjunction with the planned meeting of the National Committee on Soil and Terrain. The workshop will be an opportunity to share experiences and learning's from the 4th global digital soil mapping conference held in Rome, at which CSIRO supported attendance by a number of Australian agency staff currently engaged in related activity. The Canberra workshop will also provide opportunity to discuss digital soil mapping project activity by CSIRO, University of Sydney and state agencies. It will also present updates on related covariate data sets such as GeoScience Australia's gamma-radiometrics, GA/BRS dynamic land cover products and CSIRO shuttle radar digital elevation model and derivatives.

The workshop will introduce digital soil mapping concepts, activity and opportunities to the NCST and will be the basis for clarifying proposed ACLEP projects and for future strategic planning in this key area of the ACLEP workplan.

APPENDIX A – FUNDING DEED 2009 - 2010 SCHEDULE 2 MILESTONES AND KEY PERFORMANCE INDICATORS AND INDICATIVE FUNDING

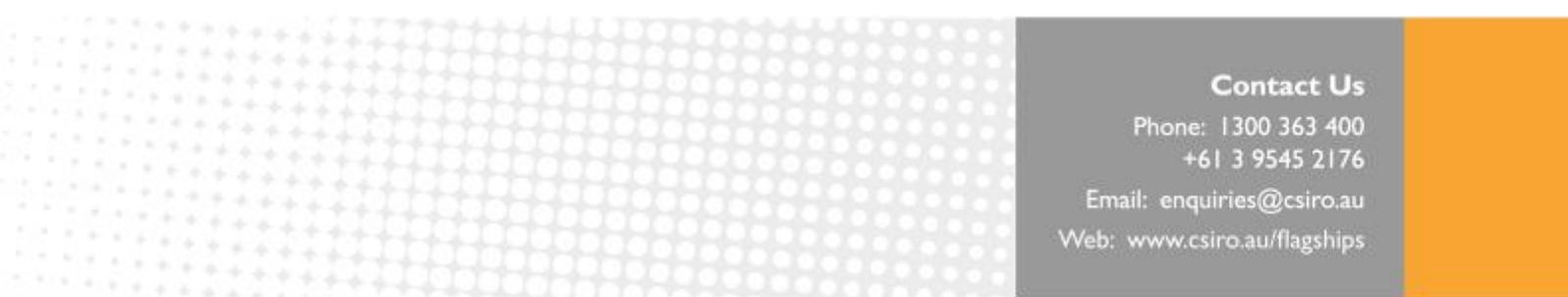
BACKGROUND	KPI	ACTIVITIES
1. Build coordination and partnerships		
2009 – 2010 DAFF \$22,000 CSIRO \$22,000	Report on strategic data needs and gaps for ASRIS Report on current status of the soils data and information infrastructure governance arrangements with recommendations for improvements An annual statement of information currency, spatial coverage and completeness for key theme areas	Review of key clients, data needs, availability and gaps Review current data custodianship and licensing approaches and issues
2. Promote standards and guidelines		
2009 – 2010 DAFF \$22,000 CSIRO \$33,000	Report recommending ways to advance online data delivery to ASRIS to improve future update processes	Review existing ASRIS technical guidelines and ways to improve national data collation such as through adoption of community data schemas
3. Deliver ASRIS the national soil information infrastructure		
2009 – 2010 DAFF \$165,000 CSIRO \$132,000	Operational ASRIS data base and interactive web mapping tools More comprehensive links to related soil information initiatives	Ongoing management and development of ASRIS hardware and software systems Improve linkages to other relevant soil information initiatives as available (eg salinity monitoring, Healthy Soils knowledge bank, GRDC better fertiliser decisions)

APPENDIX A – FUNDING DEED 2009 - 2010 SCHEDULE 2 MILESTONES AND KEY PERFORMANCE INDICATORS AND INDICATIVE FUNDING

4. Maintain upload of historic data to ASRIS		
2009 – 2010 DAFF \$176,000 CSIRO \$44,000	Updates of available site, detailed and regional mapping data in ASRIS including visualisation through the web	Capture additional State and CSIRO data sets dependant on capacity of states to deliver
5. Facilitate filling major data gaps through digital soil mapping		
2009 – 2010 DAFF \$132,000 CSIRO \$220,000	Report on feasibility and set of recommendations for implementation Funding proposal for strategic national data acquisition Progress report on template projects which will apply digital soil mapping approaches and test implementation	Assess techniques and data sets available for implementing digital soil mapping in Australia Develop draft funding proposal for implementation of approaches across whole continent Establish proposals and contracts for 2 template projects
6. Strengthen The National Soil Archive		
2009 – 2010 DAFF \$55,000 CSIRO \$44,000 (+\$60,000 strategic investment not in this contract)	Operational soil archive – accessed for emerging issues eg. carbon levels NIR/MIR spectral library from archived soils	Maintain and enhance the capacity of the National Soil Archive Develop and implement procedures for rapid NIR/MIR scanning of samples as part of the archiving process
7. Develop national reports		
2009 – 2010 [Note: Report to be completed over 2 years] DAFF \$55,000 CSIRO \$11,000	Draft tactical report on nutrient management	Develop an outline of draft for a paper addressing broader nutrient management and accounting issues in Australian soils

APPENDIX A – FUNDING DEED 2009 - 2010 SCHEDULE 2 MILESTONES AND KEY PERFORMANCE INDICATORS AND INDICATIVE FUNDING

8. Improve communications and promotion		
<p>2009 – 2010</p> <p>DAFF \$22,000</p> <p>CSIRO \$33,000</p>	<p>Up to date relevant website for ACLEP including improved NCST committee member communication and contributions</p> <p>ACLEP communications strategy</p>	<p>Re-fresh and enhance the ACLEP web site to provide appealing and relevant soil and operational related information.</p> <p>Develop a communications strategy identifying key client and messages and recommendations for improved communication and promotion of ACLEP and NCST related activities, products and events.</p>
9. Support skills and capacity building		
<p>2009 – 2010</p> <p>DAFF \$11,000</p> <p>CSIRO \$11,000</p>	<p>A range of conference, workshop and scientific papers as well as training materials, courses.</p>	<p>Hold a national workshop on application of digital soil mapping approaches.</p>



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CSIRO and the Flagships program

Australia is founding its future on science and innovation. Its national science agency, CSIRO, is a powerhouse of ideas, technologies and skills. CSIRO initiated the National Research Flagships to address Australia's major research challenges and opportunities. They apply large scale, long term, multidisciplinary science and aim for widespread adoption of solutions.