CLIMAG

ISSN: 1441-7987 Issue 6, June 2002

NFF launches *Prospectus* for new generation R&D

Photo by Glenn Conroy

Ian Donges speaking at the launch of the *Prospectus*.

President of the National Farmers' Federation, Ian Donges, has launched an ambitious plan to increase the number of farmers using seasonal climate forecasts to better manage their farm businesses, and to protect Australia's natural resources.

"A recent survey shows that around 40% of Australian farmers take seasonal forecasts into account in farm decision-making,,, Mr Donges said.

"There are clear advantages to be gained through more informed risk management, and it is time for all farmers to share in these benefits.,,

"For an investment of $6 million over the next four years, the *Prospectus for Managing Climate Variability* shows the potential to deliver better production decisions, more accurate management of our water resources and protection of our natural resources.,,

The *Prospectus* builds on the successes of CVAP and will have a broader focus to include applications in agriculture, fisheries, forestry, as well as priority issues in water and natural resource management.

"Environment Australia, the Department of Agriculture, Fisheries and Forestry-Australia and each of the Research and Development Corporations should make funding this program a priority,,, Mr Donges said.

He also outlined the many ways landholders were beginning to use climate forecasting in their farm operations:

- The RAINMAN Streamflow software assembled data from 400 streams nationally and forecasts stream flows based on seasonal rainfall forecasts. Further development of Streamflow will make irrigation water trading markets better informed, help plan environmental flows, and could increase the managed water yield from catchments by up to 20%.
- The Oceans to Farms project linked ocean temperatures to soil moisture models to directly forecast crop and pasture growth. Future development of this technology could better predict fuel loads as part of bushfire management.
- The sugar industry has trialled seasonal climate forecasts as a basis for whole-of-industry scheduling to assist the industry coordinate and manage planting, milling, irrigation and marketing decisions.

CVAP Chair, Mike Logan (see page 2), said the 2002-2006 *Prospectus* presented opportunities to move beyond preparing for drought, to look for new ways farmers, land managers, foresters and fishers can benefit from seasonal climate forecasting.

In this issue....

Don't forget the CVAP website : <www.cvap.gov.au>

Department of AGRICULTURE FISHERIES & FORESTRY - AUSTRALIA

The Climate Variability in Agriculture R&D Program was initiated and is mainly funded by AFFA. Land & Water Australia administers the program which is jointly supported by the following organisations:

CVAP Climate Variability in Agriculture R&D Program
Land & Water Australia
National Farmers' Federation
Dairy Research and Development Corporation
GRDC Grains Research & Development Corporation
Sugar Research and Development Corporation
RIRDC Rural Industries Research & Development Corporation

CVAP News

From the Chair

The success of the launch of the *Prospectus* for a follow-up to CVAP, and the media interest really made it a watershed in our development. The strong support from the National Farmers' Federation has given us a great start in developing a new program to build on CVAP.

There are two features of the new directions that appeal to potential investors:

- the emphasis on adoption—this will meet increasing demand from users more aware of opportunities to manage risks a season ahead now that CVAP has delivered on tools and techniques that can be more readily put to work on specific industry and regional issues, and
- the potential applications in a wide range of natural resource management issues, including water resources.

As I pointed out in my Introduction in the *Prospectus*, a new program will meet the increasing demand to turn good science into good environmental and production outcomes on a national scale.

I also said that given the impacts climate variability has on all industries, it was appropriate that the rural R&D Corporations contribute up to 0.5% of their expenditure so that we can have a viable national program.

> More than any other research issue, there are national tasks to be done, tasks that simply can't be done by agencies on their own. Climate change adds urgency. CVAP provides the understanding and tools to adapt as it happens.

The 2002-2006 Program will target increased adoption in a wide range of industries by working closely with existing programs of the rural R&D Corporations.

CVAP has been perhaps the outstanding example of a coordinated program involving many of the R&D Corporations. That gives a springboard for more rapid adoption using products developed by CVAP.

The opportunities in natural resource management extend from policy development through to setting and monitoring targets, and the changes in practice to achieve the targets.

Many of the big impacts on the environment are all too obviously due to the big climate extremes, the floods and droughts. Do catchment management plans build in managing the major climate risks?

We look forward to a new program that better equips us to meet the risks and the opportunities ahead.

Mike Logan
Chair, CVAP Management Committee

About CLIMAG & CVAP

Climag, as the newsletter of the Climate Variability in Agriculture R&D Program (CVAP), has an important role in promoting the overall goal of the program:

> *"To work with the Australian agricultural sector to develop and implement profitable and sustainable management strategies which prepare it to respond to the major opportunities and risks arising from climate variability."*

CVAP is a Commonwealth Government funded R&D program, and part of Agriculture — Advancing Australia. The major stakeholder is Agriculture, Fisheries and Forestry — Australia (AFFA). The program is administered and supported by the Land & Water Australia.

Four other R&D Corporations (see page 1) also currently support CVAP through funding for generic projects and for partnership funding of projects of value to their specific industry or charter.

The current phase of CVAP ends on 30 June 2002. For further information on CVAP go to the CVAP website at <www.cvap.gov.au>.

CVAP can improve outcomes?

There are significant opportunities for CVAP products and a perspective that explicitly recognises climate variability perspectives.

This is a key finding of a recent desk-top consultancy led by Dr Mark Howden of CSIRO Sustainable Ecosystems.

As Dr Howden reported, most natural resource management policy makers had only the most general experience with and understanding of the CVAP products.

Furthermore, a common view was that regional policymakers – those expected to have significant responsibilities under existing or developing programs such as NAP – were even less well aware of the issues, tools and capabilities.

In contrast, adoption and understanding at the management unit level (eg. farmer, water manager) was perceived to be quite good although there was often not a good understanding that helping these natural resource managers make better tactical decisions can lead to better strategic outcomes.

The report is available on <www.cvap.gov.au>.

Factsheet Updates

Updates for concluding projects are now available on <www.cvap.gov.au> under 'Projects'. These follow on from the original set of 32 which included factsheets on each of the research projects funded by CVAP, and four general factsheets on the program.

To learn more about the CVAP research projects please contact the project leader listed in each factsheet.

Ocean reflections on seasonal climate prediction

Guest Spot

By Dr Gary Meyers

I first encountered the idea that El Niño could be predicted when I was a graduate student.

Klaus Wyrtki, Professor of Oceanography at Hawaii, the original "father of El Nino,,, came into the students' offices and said excitedly: "The wind changes in the West,,!

Puzzled, we began asking questions, and eventually understood that he was talking about a massive, wind-generated change in ocean currents that happened months before the SST (sea surface temperature) changes that mark El Nino.

What followed was an exciting decade when numerous studies probed deeper and deeper into the physical reasons why the ocean behaved as it did; when commitments were made (at least in principle) to collect extensive Pacific Ocean data; and ultimately when the first successful prediction of El Nino was made in 1985.

There followed a second exciting decade—the Pacific Ocean observing system was fully developed, ENSO prediction systems were made "operational,,.

But also during this second decade we learned that predicting SST in the eastern Pacific wasn't enough for Australia. We needed rainfall over the whole continent and the rainfall pattern was quite different for each episode of El Nino.

Also in the second exciting decade, Neville Nicholls discovered an "Indian Ocean Dipole,, which seemed to offer a chance for improved prediction, at least for South Australia and perhaps other States in the south-east.

The Dipole has become a controversial idea in Australia, with some (a lot of Australians) saying it is nothing more than a remote manifestation of El Nino, and others (many Japanese, some Americans, and myself) saying it can grow and sustain itself by its own internal oceanic mechanisms. The fact is that this is a challenging scientific problem that will take time to sort out.

But let's come back to Australian rainfall. Predicting Indian Ocean SST, like El Nino in the Pacific, will not be enough for Australia.

So what is the way forward for research? The direction I would set is based on the following premise – or call it a hypothesis if you want because it's supported by observational evidence.

Australian rainfall is sensitive to small changes in the pattern of SST around the continent – particularly to the warm tropical waters to the north. If this is true, then the most promising way to get a handle on predicting Australian rainfall better than El Nino correlations is using a coupled numerical model of the ocean/atmosphere.

The model has to simulate observed, regional mechanisms of ocean-atmosphere interaction reasonably well.

We (Australians) are now in our second generation of such a model for our region, partly due to generous support from CVAP.

What can we say about it? First, the present model won't solve our climate problems. It's only a start. Second, as far as predicting El Nino goes, it performs as well as any of the other climate prediction systems around the world, arguably better.

It simulates regional temperatures better than earlier models. I suspect that the main weaknesses of our model are in the atmosphere—its ability to respond with convection to small changes in surface temperature—and in the air-sea coupling that generates SST.

These are the areas where we need to focus future research.

Photo by Bruce Miller

Gary is holding an Argo ocean profiling float, a new robot-technology to measure temperature and salinity to a depth of 2000m. Three thousand floats will be deployed world-wide to monitor climate variability and change.

Dr Gary Meyers is Oceans and Climate Program leader at CSIRO Marine Research in Hobart.

After working on the ENSO phenomenon at Scripps Institution of Oceanography, he came to Australia in 1983 and switched his primary research interest to the Indian Ocean.

Gary has been leader of two major CVAP projects including COR5 as reported in the article on page 7 on Next Generation Forecasts.

He has had a key role in integrating climate research between climate and ocean scientists, and in developing links with potential users in agriculture and fisheries applications. (Ed.)

What's New on <www.cvap.gov.au>

Recent reports include the Program Review and the *Prospectus*.

The CVAP website also includes links to other climate variability publications, this and previous issues of *Climag*, an About CVAP section, a What's New (updated at the beginning of each month), a What's Coming Up section, and other useful links.

The Master of Climate stories are also available to provide a wide range of case studies on applications of climate information in regions and industries around Australia.

ighlights Highlights from the *Prospectus*

"The Grains Council of Australia endorses the creation of another three-year CVAP program so we don't lose the benefits of industry's investments to date. We encourage each of the relevant Research and Development Corporations; Agriculture, Fisheries and Forestry — Australia; and Environment Australia to commit to funding the program over the next three years."

Keith Perrett, President, Grains Council of Australia

"Dairy famers in northern Victoria have been under enormous pressure from lower than average rainfall over the past five years. Is this just a normal climate variation, within the limits of El Niño and La Niño, or is it part of the so called climate change, and the greater variations in weather patterns that are likely to occur?"

Stephen Mills, Chairman, Australian National Committee on Irrigation and Drainage

This investment *Prospectus* reports on the achievements of CVAP 1997–2002, and explains why a new, broader program is required for the period 2002–2006.

Achievements 1997—2002

CVAP commissioned experienced agricultural economics, farm management and natural resources consultants Hassall and Associates to conduct a program-level review of the program. This was released in April 2002 and is available on <www.cvap.gov.au>.

The Review cited the AFFA survey that found close to 40% of Australian farmers take seasonal climate forecasts into account in farm management decisions.

CVAP had been a prime driver underpinning this level of adoption by targeting improved forecasts and more effective communication.

The Review reported CVAP had:

- developed improved understandings of climate variability and specific products relevant to the agricultural sector;
- promoted extremely high levels of collaboration amongst researchers in different disciplines and increased research capacity;
- laid the foundation for further adoption of climate risk management strategies through a comprehensive applied research program; and
- should focus on the improved uptake of decision support tools in the 2002-2006 program.

Without CVAP, the Hassall Review concluded:

- agriculture would not have been recognised as a client for provision of climate services, and the agricultural sector and policy makers would have relied on understandings that were not geared towards agriculture; and
- there would have been a lack of coordination of climate variability R&D.

The basis of the new program

Rural industries and natural resources managers have set new challenges for the program from 2002-2006.

The emphasis on adoption, and extending applications to natural resource management issues, were two of the challenges identified as part of the consultation during the review process in 2001.

A feature of the *Prospectus* is the strong industry endorsements (from the National Farmers' Federation and individual commodity organisations) for the proposed program and its new directions.

AFFA's 2001 report *Innovating Rural Australia—Research and Development Corporation Outcomes* nominated:
"better understanding of climate impacts on production"
as one of six priority areas for investment to continue strong productivity growth in rural industries.

The benefits from a new program

The outcome sought for the new program is:

Managers increasing profitability and sustainability by using climate variability information and products in applications in agriculture, fisheries, forestry and natural resources.

The key indicators relate to increased adoption by farmers and natural resource managers.

The *Prospectus* sets out a new, broader program that will:

- improve adoption of products created by CVAP;
- provide a greater focus to climate variability products being applied to improve natural resource management; and
- look for new opportunities for Australian farmers to benefit from the national investment in managing climate variability.

Investing in the new program

CVAP is seeking to fund a $6 million managing climate variability research and development program over four financial years, commencing on 1 July 2002 and running to 30 June 2006.

Investors are encouraged to participate at a number of levels from Program Level Funding through to co-funding specific regional or catchment projects.

To ensure the program is viable on a national scale, funding commitments of 0.5% of total annual budget is sought from each of the R&D Corporations.

Investors will be able to leverage the knowledge created in CVAP 1997-2002 to create rapid returns in adoption of tools to manage climate variability in their client industries, regions and catchments.

Investment at this scale by each of the RDCs will give the program the critical mass to invest in national research, and to provide leadership in regional and industry initiatives and in natural resources management applications.

The new program will develop outputs in three components to meet the demand for improved products and to increase adoption and implementation.

1 Outputs for agriculture, fisheries and forestry managers

One key target is to increase the proportion of Australian farmers taking seasonal climate forecasts into account in management decisions from current levels of about 40% to 60% by 2006.

The program will be working with farmers, fishers and foresters, and natural resources managers to develop seasonal forecast products relevant to their specific needs.

The new program will work closely with users to develop more relevant products that allow them to respond more confidently to major climate impacts and develop better adapted production and natural resource management systems.

A major challenge for the new program is to link the knowledge generated by the program to other production indicators, such as soil moisture and temperature, to give end users whole-of-farm decision support tools.

The new program can build on knowledge generated by CVAP 1997–2002 to develop new general purpose tools and make rapid progress in adoption.

2 Outputs for managing natural resources

The new program will have a much greater focus on identifying and developing applications with potential to contribute to the sustainable use and management of natural resources and improved biodiversity outcomes.

CVAP 1997–2002 helped us understand that climate extremes are the major drivers of impacts on natural resources sustainability.

The new program will focus on strengthening approaches to environment management and monitoring systems, and to assist land managers distinguish between climate effects and signals generated by land use change.

The challenge for the new program is to encourage the application of grazing management tools to avoid what could be the 9th major episode of rangeland degradation in the event of a major drought.

The new program will also tackle other priority natural resource management issues through the provision of new tools for catchment management.

Researchers believe use of the RAINMAN Streamflow product could make more efficient use of water currently harvested from catchments to give greater certainty to both irrigators and environmental flows, and enhance farm productivity and stream health.

3 Outputs for capacity and knowledge building

Climate and ocean research on seasonal forecasting is a relatively new area and not traditionally closely linked to agricultural research.

The program needs to maintain its crucial role in consolidating user experience and give program partners and research providers an effective national voice in the direction of strategic research on climate variability.

Program management and integration with other research programs in climate science, oceanography and agriculture, and fisheries and forestry production systems are key priorities for the 2002-2006 program.

"For research that has only taken off in the last decade with the greater recognition of the global impacts of El Niño events, a great deal has been achieved. Australian farmers need to stay ahead of their international competitors in their use of seasonal forecasts."

Christine Campbell,
Chair, Cotton Australia Limited

The Land & Water Australia view

The variability of Australian climates is among the greatest challenges facing Australian farmers – much greater than in the countries of our major competitors. The variability is also a fundamental driver of the condition of our natural resource base.

No single R&D Corporation or natural resource management agency can take on the job of tailoring climate science for Australia 's land managers.

But through a successor to CVAP, each RDC can make a small investment to deliver the best available technology to its stakeholders.

The CVAP structure encourages collaboration, giving smaller stakeholders access to expertise to understand and respond to climate-related risks and opportunities in their industry.

CVAP has been an outstanding example of RDC cooperation on an issue that concerns and profoundly affects us all. I urge your support.

Andrew Campbell

Executive Director
Land & Water Australia

"Australia's infertile soils and the trials of ENSO have forced some unusual adaptations on its plants and animals....exploiting brief windows of opportunity as they open erratically over the land."

The Future Eaters
Tim Flannery (1994)

‘How good are they?’

—A Look Back at Seasonal Climate Forecasts

Seasonal climate outlooks for rainfall and temperature have in recent years become another tool in the Australian farmers’ virtual shed.

But as many ask about the forecasts: “How good are they?„.

In a world first, a CVAP-sponsored project at the National Climate Centre (Bureau of Meteorology) has the answers for anywhere in Australia for any month.

A new web page has been developed, accessible through the SILO web-site, that outlines the performance of four seasonal outlook models that are used by organisations such as the Bureau of Meteorology, the CSIRO and the Queensland Department of Primary Industries to routinely issue seasonal forecasts.

Comparisons are made for both rainfall and temperature and results are shown for several lead times where these are routinely provided.

All information is provided in the form of “percent consistent„ plots —the easiest to understand measure developed with users of how often the forecast favoured, or did not favour, the observed rainfall or temperatures for the season.

This simple measure of consistency relates well to more complex statistical measures used to rigourously assess forecasts.

One of the advantages of such a scheme is that it more readily shows the strengths and weaknesses of existing prediction methods.

Results suggest that, amongst other things, the statistical models are still outperforming outlooks from the complex ocean/atmosphere models—but the gap is closing.

Having developed the assessment framework, other prediction schemes can similarly be assessed as and when they become available.

The web site also features a detailed, month-by-month analysis of the Bureau of Meteorology’s statistical model which is used in preparing their operational three-month outlooks.

Users can now check how well the model performs right across Australia for forecasts commencing at any time of the year.

What’s more, with the click of their mouse, users can get a break down of all the historical forecasts the model would have made for any location for all years back to 1950.

The historical outlooks are also colour coded to indicate how well they would have performed.

By examining this historical information users can make a more informed decision when assessing their current seasonal forecast—something primary producers in the rest of the world can still only wish for with their own outlooks.

The following table is an example of how the past forecasts can be examined using data from the web site for the grid around Narribri in northern New South Wales.

The Seasonal Outlook Verification page is available free from <http://www.bom.gov.au/silo/products/verif/> or by visiting the SILO seasonal outlook page at <http://www.bom.gov.au/silo/products/SClimate.html>.

For any further information, please contact **Dr Andrew Watkins** at the National Climate Centre
Phone: 03 9669 4360,
Email:<A.Watkins@bom.gov.au>

Consistency of the May Seasonal Outlooks for June to August rain Narrabri district (1988-1999)

Year (19)	88	89	90	91	92	93	94	95	96	97	98	99
Probability (%chance)												
Above normal	68	72	62	33	35	41	54	68	76	29	53	66
Below normal	32	28	38	67	65	59	46	32	24	71	47	34
Year type												
La Nina or El Nino	La N			El N		El N	El N		La N	El N	La N	

Note: Years shaded (9 of the 12) are when the favoured (above 50%) rainfall was observed. For example, in 1988, a La Nina year, the favoured rainfall was above normal (68% chance) and this resulted. The overall Percent Consistent value for this location, for the full 50-year period to 1999, was 64% of years (about 2 out of 3 forecasts consistent with the outcome).

POAMA — the next generation seasonal forecast system

The Predictive Ocean Atmosphere Model for Australia (POAMA) is a state-of-the-art ocean/atmosphere coupled model for seasonal to inter-annual prediction.

Coupled models are now much closer to delivering better seasonal forecasts and at longer lead times—six months or more ahead.

They couple the ocean and atmosphere and can use all the latest observations from ships, satellites, ground stations etc to construct a picture of what the ocean and atmosphere look like today.

A picture of how the state of the ocean and atmosphere is evolving is then generated using the coupled model. This model uses mathematical equations representing the laws of physics.

Unlike existing statistical forecasting systems, coupled models are not limited by historical relationships and can forecast a new set of climatic conditions.

For example, because they simulate the real world they have the potential to predict how the impacts of one El Niño might be different to those of another.

POAMA was developed in a joint project involving the Bureau of Meteorology Research Centre and CSIRO Marine Research, with funding provided by CVAP (COR5 project).

The model will be used in real-time by the Bureau of Meteorology to produce an eight-month forecast every three days.

Summaries of the forecasts will be made available to general users and they will be an input to the Bureau's official monthly seasonal climate outlook.

Initially only forecast of sea surface temperature will be made available. We will aim to forecast the occurrence of El Niño or La Niño. This is where this initial version of the model has most skill.

The Figure (at right) shows the model's prediction of sea surface temperature anomaly in the tropical Pacific during the onset of the 1997–8 El Niño.

The curves show the sea surface temperature anomaly in a box in the east Pacific (NINO 3 region) that is traditionally used as an index to measure the strength of El Niño. During El Niños the temperature of this box is approximately 1-4 degrees warmer than usual.

The dashed line (brown) shows the observed temperature anomaly. This rose much more sharply than usual from slightly negative at the beginning of March to around 3 degrees in October.

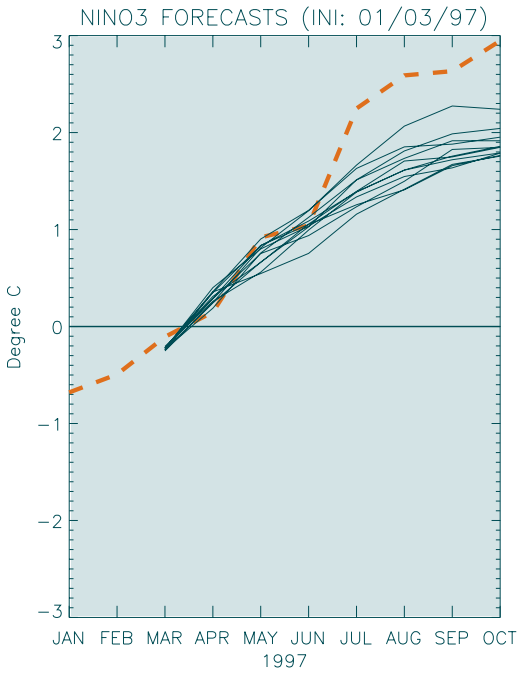
The solid lines show 11 model forecasts (an ensemble) which were started during March. The forecasts remarkably capture the rapid warming during March to June, although subsequently under-predict the full extent of this El Niño.

There was a warming trend already evident in March at the time of the forecast, but this often simply indicates a return to more neutral conditions.

One of the benefits of coupled models is that many forecasts (an ensemble) can be produced. If these are all close together, as in the forecast shown in the Figure, then we can have confidence in the forecast.

If they all differ significantly they can tell us that there is considerable uncertainty in the future and they give us the range of possibilities.

As we improve the models further and have more powerful computers to allow us to increase the number of forecasts that can



be produced, we will start to look closer to home.

We will look at how well the model can forecast Australian rainfall and temperatures. When we are confident in the local forecasts they will be made available to users through the National Climate Centre.

Compared to weather forecasting, coupled model seasonal forecasting is still in its infancy. Still, great potential lies ahead.

By continuing this collaborative work and investing in further improving our system we will reap the full benefits of coupled models and provide Australia with a seasonal forecasting capability second to none.

For more information contact the POAMA Group by email at <poama@bom.gov.au>, or go to the POAMA web site at <www.bom.gov.au/bmrc/ocean/JAFOOS/POAMA>.

"POAMA is also a delicious white wine grape of the Moldova Region of

Getting an edge on risk–climate/weather hedges a season ahead

Weather derivatives transactions that can absorb climate-related risk, including El Niño events, are now being offered by Macquarie Bank.

Weather risks are usually underwritten a month or more ahead of the calculation period. The range includes climate-related risk on a variety of weather measures including customised ones.

User friendly precipitation and temperature data for about 1000 weather stations is available to registered users at <www.macquarieweather.com>.

Factors that impact prices include historical averages, trends and variability. The major long-term forecast impact is from El Niño which tends to become clearer during May-June.

Pricing will be impacted by a forecasted El Niño depending on its severity.

Taking a long-term approach

One strategy we suggest to our clients is to take a long-term approach to hedging. If they are in an area that is particularly impacted by El Niño, we suggest a 5-year structure to get a spread.

In general, an El Niño is expected to occur once every 2-5 years.

For the areas that are at high risk (high correlation) for El Niño-related weather volatility we can also offer hedges directly tied to standard ENSO indices or others.

Typical rainfall hedging transactions are put options for a 1 to 4-month period settled against one or more (ie. a weighted basket) of weather stations' accumulated rainfall observations.

Transactions can only be structured against official BOM observations for a specific station where a good historical data set is available. Therefore, the client must be confident that rainfall in the area of concern is highly correlated with rainfall at the BOM station, otherwise basis risk occurs.

The strike level

This is typically set around one standard deviation below the 10-year average. If rainfall is below the strike level, the purchaser of the option receives a specified amount per millimetre up to a specified maximum amount.

All sorts of structures can be priced including protection against high rainfall days and a hedge against unseasonal frosts.

The cost of weather derivatives is likely to appear much higher than the cost of traditional fire and hail insurance. This is because weather derivatives usually are designed to cover events that happen much more frequently than hail and fire damage.

For further information email <ted.robson@macquarie.com.au>.

Weather derivatives and the SOI at Echuca

Weather derivatives are being increasingly used in risk management in a wide range of industries.

Unlike weather insurance no demonstration of loss is involved. Harvey Stern (Bureau of Meteorology) has explored some of the operational and pricing issues from a meteorological perspective. His most recent study (Aust. Met. Mag.,50, 171-182) has an example based on Echuca.

The principles

If rainfall in October is less than decile 4, the seller of the put option pays the buyer $100 per decile (30% of historic rainfalls, deciles 1-3, are by definition below decile 4).

A very low rainfall (decile 1) would result in a $300 pay-off. Pay-offs averaged over all years result in a buyer willing to pay $60 annually for this put option.

The Echuca example

The price and the strategy are now determined by the relationship between the September Southern Oscillation Index and October rainfall.

The example applies when the September SOI is less than decile 4 (that is SOI less than -4.7), which had occurred in 44 of 119 years to 1999.

From the pattern of the 19 of the 44 years which also had October rainfall less than decile 4, the price of the put option is calculated at $98.

Note: a two-month lag period for the SOI and a two-month rainfall period may give a more effective hedge.

In summary, the put option is used in 44 years at $98 and provides a hedge against 19 of the low rainfall October's, including 9 of the 12 decile 1 years. (Ed.)

Major projects included in the CVAP Review

For the Report on the Review of CVAP by Hassall & Asociates, and for more details on the projects see www.cvap.gov.au.

Aussie GRASS Review

The CVAP Review included a project-level scientific review chaired by Professor Henry Nix from the Australian National University (ANU) of one of CVAP's major projects — Aussie GRASS.

The final comments of the reviewers were:

"The whole team deserves commendation for their unflagging determination to put modelling concepts to work for real-world and real-time applications. The reviewers feel strongly that further investment (and policy support through SCARM and ARMCANZ) would have high pay-offs, considering the strong foundation and the functioning of the interdisciplinary team assembled for the project.

"Not to capitalise on their tremendous achievement, through continued funding and policy support, would be yet another Australian tragedy of failing to follow through on what is a major breakthrough. Yes, the models can be improved and yes, better data inputs can be derived and improved field validation developed, but the essential foundation is there.

"Most importantly, the interdisciplinary team assembled for this project should be allowed to continue their great work."

Photo by QDNRM (Alan Peacock)

At the presentation to recognise achievements of the project teams around Australia who were involved in the AussieGRASS and RAINMAN Streamflow projects, CVAP Chair Mike Logan (right) is seen with (from left) Wayne Hall (AussieGRASS leader, QDNRM, now MLA), Barry White (CVAP Coordinator), and Nic Clarkson (RAINMAN Streamflow, QDPI).

Streamflow Launch

The CVAP Review also included a review of the RAINMAN Streamflow launch and workshop held by Lake Burley Griffin in Canberra in late 2001.

Streamflow works as a supplement to Australian RAINMAN which aims to provide rainfall information for better management of climate information, and includes data for more than 400 gauging stations throughout Australia.

Streamflow allows users to:

- examine historical records of streamflow;
- analyse monthly and daily streamflow and input their own data; and
- forecast seasonal streamflow based on the Southern Oscillation Index (SOI), Indian Ocean Sea Surface Temperature and other predictors.

Photo by Barry White (Ed.)

With Lake Burley Griffin as a backdrop, Don Blackmore (left), Chair of the Murray Darling Basin Commission, who launched RAINMAN Streamflow, is seen with irrigators involved in testing and development (second from left), Peter McPhillamy (Forbes, NSW), Doug Lee (Proserpine, Qld), and Ross and Linda Warburton (Collie, WA).

The review concluded:

"There was a very positive and enthusiastic response to the launch and associated training workshop. The launch and workshop were seen as very successful in presenting Streamflow to a diverse audience and providing training to those with a requirement for more comprehensive knowledge of the product. Ninety percent of participants at the workshop stated that they would recommend the product to others."

What's news?

Seasonal forecasts for wool producers

Wool producers in the pastoral zone will be making more effective use of improved seasonal climate forecasts in grazing management. That is the aim of the climate variability component of Land, Water & Wool (LWW).

Australian Wool Innovation Pty Ltd and Land & Water Australia have developed LWW as a new partnership focusing on sustainable wool production in Australia. Managing Climate Variability is one of the sub-programs of LWW.

Regional projects will work with wool producers to deliver improved products for managing one of their major risks — rainfall variability.

Opportunities to develop information more relevant to producer decisions include forecasting pasture growth rather than rainfall—skill is then usually amplified.

Pasture growth can now be well enough simulated for most Australian pasture communities to capture the broad year-to-year variability in pasture production.

Studies of improved forecasts show:

- forecasts with a longer lead-time or higher skill are likely to substantially increase production benefits; and
- there are strategies which substantially reduce risks to the natural resource base whilst maintaining cash flows.

For further information contact the Program Coordinator, Barry White, phone (07) 33715878, or email <bjwhite@b022.aone.net.au>.

FarmBis funds climate training projects

Recent education and training projects funded as part of the FarmBis Australia program include two on training in the application of climate information.

The projects are ClimEd—An applied climate education program for rural industry in Australia (AgForce Queensland), and a pilot training program on information technology that empowers Australian farm businesses to better deal with climate, market and environmental risks (CSIRO Sustainable Ecosystems).

For more information on FarmBis Australia call 1800 686 175 or visit the website at <www.affa.gov.au/farmbis/australia>.

Climate applications scientists awarded

Included in the four Australian Institute for Agricultural Science and Technology Awards (Queensland) were Dr Russell Muchow (Australian Medal for Agricultural Science) who initiated the SRDC/CVAP project on climate applications in the sugar industry; and Professor Graeme Hammer (Fellow) for contributions which include understanding issues that impact on the productivity and sustainability of agricultural practices within the highly variable dryland farming systems in Australia and also in other dryland farming systems around the world.

World first at USQ

The University of Southern Queensland (USQ) recently instituted the world's first undergraduate program that specialises in statistical and physical climatology.

Dr Roger Stone, acting Director of DPI's Queensland Centre for Climate Applications in Toowoomba, has helped to establish the program, and Dr Joachim Ribbe has been appointed as a Lecturer in Climatology to develop and deliver the program content.

In addition, USQ also announced several Degree programs suitable for those with or without prior university training – these include a *Certificate in Climate Studies*, a *Graduate Certificate in Climate Sciences,* and a *Graduate Diploma of Climatology.*

All courses are taught on campus or in external mode over a period of one to three years. For further information phone (07) 4631 1452; e-mail <Joachim.Ribbe@usq.edu.au>; or go to <http://www.usq.edu/users/ribbe>.

Rain for Grain

April in the Mallee—A GRDC–funded project has looked at the value of April rain as a predictor of growing season rain and cropping strategy in the Mallee. (CSIRO Land and Water Sheet No 24, 2002 <victor.sadras@csiro.au>).

Potential yield calculator—A soil water balance model is used to estimate crop yield taking account of evaporation and daily rainfall. The computer program can help decisions by assessing the likelihood of reaching a target yield. The model was developed by Dr David Tennant. Enquiries to AGWEST on 08 9090 2171.

Odds & Sods

The Noah Rule — *'Predicting rain doesn't count, building arks does!'*— Warren Buffet, (world's second richest man).

Damnation and punting on the Murray— South Australian Government Minister gets quinella of portfolios — Gambling and the Murray River.

El Nimbus — May form guide: Soft-track lover El Niño (Jeune-Ozone Friendly) storms home at Caulfield at 8/1 (an 11% chance), and then fades to fourth at 4/1 next start at Moonie Valley.

Gambolling on youth — *'We're not playing for sheep stations'* — The new code for parent behaviour at junior AFL games.

Mind games — '*I don't believe in luck, but I do believe in putting a value on things'* — economist and Nobel Prize winner James Nash (aka Russel Crowe) in *'A Beautiful Mind'*.

Odds & Sods

Capitalising on climate — *Bowen — Australia's Climate Capital.* Bruce Highway hoarding.

Pennies from heaven — *'Australians spent $1.5 billion on bottled water last year'* — Australian Bottled Water Institute.

Blowing in the wind — *'We are on target to produce enough power from the wind for 2.3 million households by 2010, and provide 10,000 rural jobs.'* — The Australian Wind Energy Association.

Ozymoron — Bazza Mackenzie's psychiatrist was probing *'And about your relationship with your mother'?* Bazza responded — *'I am her son'.*

Unauthorised discoveries — for which Mathew Flinders was often in trouble with the Admiralty, also in trouble for his endeavours to rebadge *Terra Australis Incognita* as Australia.

Odds & Sods

Fly-bye — 'We all make mistakes, that's why they put rubbers on pencils' — Lindsay Fox.

Culture vulture's sweet revenge — 1929 — *Russian ballet dancer Pavlova bitten by galah in Rockhampton Botanic Gardens'* — ***Courier Mail's* Our Queensland Series No 4, May 2002.**

The media's message — '*Stay away from the media circus and you won't become a clown'* — George Negus, ABC.

Alec Campbell 1899-2002 — The last Gallopili ANZAC and the first recipient of the Centenary Medal, returned after medical discharge to *inter alia* raise nine children, sail six Sydney-Hobarts, and complete an Economics Degree.

And may the odds be with you — from what may be the last *CLIMAG* (Ed.).

What's coming up?

Climate Science, Affairs & Policy Workshop for Non-Specialists 30 September–4 October 2002

The University of Southern Queensland in Toowoomba is hosting a five-day workshop presented by Dr Mary Voice.

The workshop will identify the key issues and processes within the climate system for which an understanding is required in order to make sound policy decisions.

National State of the Environment monitoring and reporting, and the climate change detection problem will be used as illustrations. The issue of global water resources will be used as a case study. For further information phone (07) 4631 1452 or email <Joachim.Ribbe@usq.edu.au>.

'CLIMATE and CULTURE in AUSTRALIA'

Climate figures daily in the news, but how well do we understand the role it plays in the society and culture of this, the El Niño continent?

A Conference on CLIMATE and CULTURE in AUSTRALIA to be held at the Australian Academy of Science in Canberra from 25 to 27 September 2002 will examine this question.

The experience of climate and our fascination with the weather provide fertile grounds for exploring the links between such fields as meteorology, art, politics, literature, archaeology and economics. For details see <http://ozhistory.info/weather>.

ANZ Climate Forum

The next Forum following on from Darwin in September 2001 is likely to be held about the end of March 2003 in Palmerston North in New Zealand. Enquiries to <R.Heerdegen@massey.ac.nz>.

Your feedback on *Climag*

Readers responding to the last survey showed very high levels of satisfaction with *Climag*.

About 90% agreed or strongly agreed on readability and on adequacy of technical content. Some 70% thought that in their experience farmers and natural resource managers were increasingly taking seasonal climate forecasts into account.

When asked if they had followed-up on some of the articles in *Climag* (eg. contacted researchers, purchased publications), some 60% had done so.

Climag reader survey comments

- More specific forecasting on the potential consequences of climate variability and change for Australian water and resources would be useful.
- A great publication, understanding our climate is vital to agriculture. It is one way to reduce risks.
- *Climag* is a very worthwhile publication. CVAP is a very important R&D program because of the importance of gaining a better understanding of climate variability.
- Brings together the theoretical and practical aspects of climate variability.
- *Climag* is always full of interesting information, well done!
- Good concepts and great publication.
- Vital that *Climag* continues indefinitely – it's a great information source for us farmers.
- Program and newsletter essential to those on the land and it's a great resource for ag-science and agriculture students. Broader community would benefit from exposure to matters raised.
- A publication like this is greatly needed. It's the way I keep in touch with climate research.
- Great managing – not too long, easy to read, good colours used.
- Really of considerable benefit in keeping me in touch with development in climate and agriculture. Often I become aware of projects I am unfamiliar with.
- I will be disappointed if *Climag* does not continue.

CVAP Contacts

CVAP Program Coordinator & *Climag* Editor

Barry White
PO Box 916
Indooroopilly QLD 4068
Phone:(07) 3371 5878
Email:<bjwhite@b022.aone.net.au>
Website:<www.cvap.gov.au>

***Climag* distribution**

Brian Flanagan
Capital Public Affairs Consultants
PO Box 172
O'Connor ACT 2602
Phone:(02) 6248 9344
Email:<cpac@cpac.com.au>

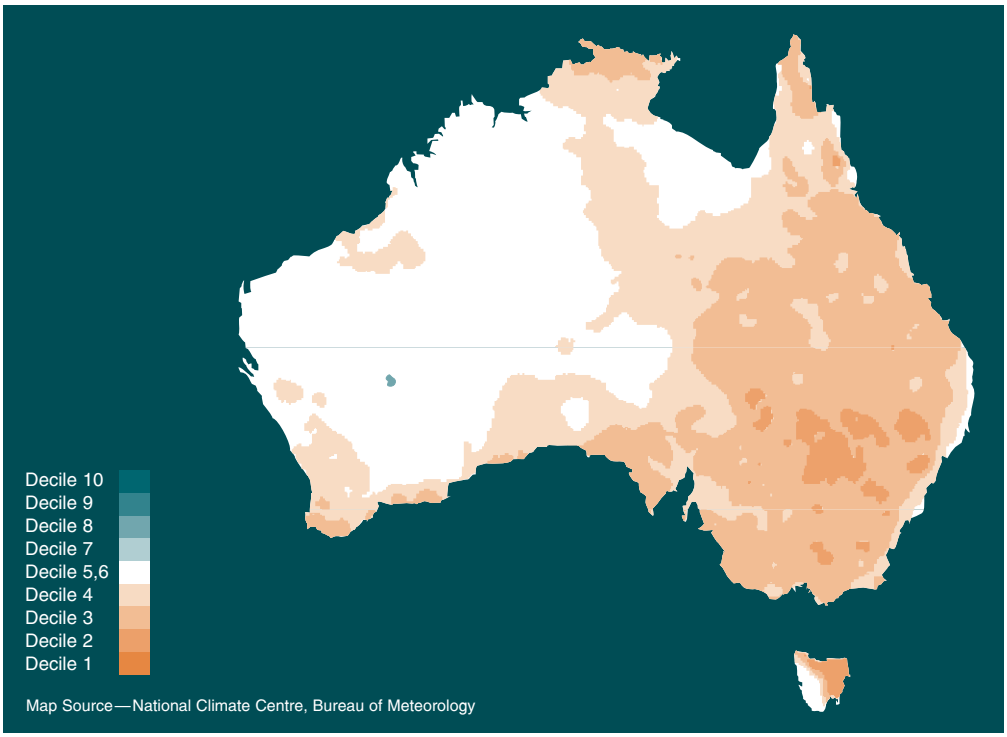
General natural resources R&D enquiries

Land &Water Australia
GPO Box 2182
Canberra ACT 2601
Phone:(02) 6257 3379
Email:<public@lwa.gov.au>
HomePage:<www.lwa.gov.au>

Print Post Approved PP255003/04168

Top 12 El Niños

Much lower than average winter-spring rainfall was experienced by much of eastern and southern Australia during the 12 major El Niño events of last century.



El Niño is a warming of the eastern and central Pacific.

For the 12 major El Niño events last century, vast areas of eastern and southern Australia averaged below normal winter-spring rainfalls.

Note that the map (as on the *Prospectus* cover) is only for the top 12 El Ninos—there were about as many additional less intense El Nino events last century.

Notable points in relation to winter-spring rainfall are:

- the greatest impact was in central-northern New South Wales;
- the Western Australian impact mainly in the south-west;
- the reduced impact on the east coast (where most Australians live); and
- the map is an average of the top 12 El Niños, the footprint of particular events is variable, so that any particular location would have experienced a range of seasons from drought to wetter than normal.

The map and a companion one for La Niña events is available at <http://www.bom.gov.au/climate/ahead/soicomp.shtml>.

DAD AND DEL