STEP Matters

No. 164 April 2012

In this issue:

Walk: Sunday 15 April : Royal National Park.

Medium grade day walk taking in the beautiful tall forest and extensive coastal views from the Cliff Track plus the rare littoral rainforest of Palm Jungle. Limit 15.
Meet at the car park adjoining Otford Lookout at 9.45 am for 10 am start
To book contact Andrew Little, 9924 7212 (after 7.30pm). Bookings essential

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Talk: Tuesday 1 May: **Fungi and the interdependency of species**
Speakers: Dr Ray and Elma Kearney
8.00 pm – St Andrews Church Hall, corner Chisholm and Vernon Streets, Turramurra

Lane Cove Bushland Park (LCBP) in Sydney, New South Wales is a site in the middle of a high-density residential area. Centred about a tributary of Gore Creek that runs into the nearby Sydney Harbour, the warm temperate gallery forest is the location of at least 27 species in the tribe Hygrocybeae. The Hygrocybeae Community of LCBP has been legislated under the NSW Threatened Species Conservation Act, 1995 as endangered. A Final Determination listed nine holotype taxa as either endangered or vulnerable under the appropriate section of the Act. In addition, the LCBP has been listed on the Register of the National Estate by the Commonwealth Heritage Commission as a site of national significance based principally on its mycological assemblage. These successful prototype initiatives have depended upon the collaborative efforts involving amateur mycology enthusiasts and a professional taxonomic mycologist as well as the local Lane Cove Council that is very pro-active in conservation. This synergy of initiative, originality of ideas and keenness of observation has achieved landmark decisions for mycology and conservation of fungi in Australia.

A part of this presentation will give a brief overview of the fungi of LCBP and its listings. The second part of the presentation will give a summary overview of the numerous changes in the processes of biological repair, renewal and regeneration after bushfires. This will include a time-lapse photo sequence of a bacterium, isolated from a truffle-eating beetle, of the phenomenon of 'flocking' through quorum sensing.

The final aspect of the presentation will show rare documentation of the complex interdependency of numerous species of fungi-dependent ground orchids and the amazing mechanisms of orchid pollination dependent upon deception and mimicry.

In short, the program will highlight 'Living Art' in Nature's Gallery with an emphasis on the inter-relationships of species involving fungi that have a kingdom of their own, separate from plants and animal

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STEP Walk: Sunday 20 May 2012: Two Creeks Track

The Two Creeks Track passes by sandstone outcrops, magnificent wildflower displays [in season], scenic water views and tidal wetlands of Middle Harbour. Each of these environments supports a different plant community. Within these communities there are a rich variety of textures, colours and shapes.

Meet:	9.15am for a 9.30am start. Park at the shopping centre car park at the corner of Crana Ave and Wellington Road, East Lindfield. A car shuttle will transfer walkers to the start point at Slade Avenue Lindfield. Walkers will return to the car park via a 0.8 km street walk.
Length:	Approximately 6 km
Duration:	Approximately 2.5 hours
Difficulty:	Medium
Bring:	Water, sun protection, a torch for the under road tunnel, and hiking boots Coffee, tea and snacks will be available at the 'Deli in the Park' in the East Lindfield shops next to the car park.
Bookings:	Contact Frank Freeman on frankfreeman@optusnet.com.au or on 99831586

Advance Notice – STEP Lecture for 2012

We are delighted that Dr Ian Lowe, AO, will present our annual STEP Lecture on 6 November 2012 (Melbourne Cup Day evening). Ian Lowe is Emeritus Professor of science, technology and society at Griffith University in Brisbane and President of the Australian Conservation Foundation

See page 8 for a review of his latest book called "Bigger or Better, Australia's population debate?

Ku-ring-gai Environmental Grants

We are pleased to have received a grant from Ku-ring-gai Council for the installation of signs along the STEP Track starting at Kingsford Ave, South Turramurra. The signs will provide information at intervals along the track that will help visitors identify the features of landform, vegetation and animal life along the track.

Update on Local Issues

Lane Cove National Park

In February 2012 STEP Matters we reproduced a letter STEP sent to Premier O'Farrell expressing our concern with cutbacks in the funding for bushcare and essential bush regeneration in Lane Cove National Park and other national parks.

The response we received from Mr O'Farrell stated that the funding for metropolitan national parks has actually increased by 2.4% over the 2010-11 allocation. This may well be the case for the total allocation. However the amount available for bushcare has reduced. The reduction has had an impact in three main ways:

- Field staff numbers in Lane Cove National Park have been reduced by one and a half positions in the past 3 years
- Funds are not available for new equipment unless community groups are willing to provide donations
- Recurrent grants that have been the source of funds for new bush regeneration projects and maintenance have been terminated.

Mr O'Farrell points out that National Park staff duties include bush regeneration and weed management activities. However with fewer staff employed the time available for these duties has been reduced considerably. Significant progress can only be made in reducing weed infestations by the use of

contractors. But there is now no funding for contract work and senior officers are mowing lawns and cleaning toilets and barbeques!

We are currently left with reliance on stretched staff and volunteers.

Mr O'Farrell emphasises current government work on regional pest management strategies and the priority the Government places pests and noxious weeds. More information about this on pages 5 and 6.

We are trying to get the Premier to come on a walk with us to see for himself the significance of this issue.

NSW 2021 Plan

The State government is currently organising a series of community workshops in the process of developing regional action plans contributing to the statewide NSW 2021 plan that will guide policy and budget decision making over the next 10 years. The stated objective of the plan is to "*rebuild the economy, return quality services, renovate infrastructure, strengthen our local environment and communities, and restore accountability to government".*

The northern Sydney regional action plan was released on 29 March, having been promised last September. Copies can be downloaded from http://haveyoursay.nsw.gov.au/topic/northern-sydney. The workshop to discuss this plan was held on 2 April. Members of the public can also make online comments via a link at the same website address.

The NSW 2021 Plan includes the goal to "reduce the impact of invasive species at priority sites on NPWS parks and reserves leading to a positive response of native biodiversity at 50% of these sites by October 2015. However the northern Sydney regional action plan makes no reference to bushland and national parks that occupy a significant area of northern Sydney. Despite the statement that the natural environment is central to the way of life for the community, the only priority actions are to:

1. Support the completion of Floodplain Risk Management Plans in partnership with local councils for Sugarloaf Creek Catchment (Willoughby) and Hornsby Shire.

2. Increase community access to recreation opportunities while protecting the environment by:
   - constructing a bike loop in a national park in Northern Sydney; and
   - implementing standard Local Environmental Plans which provide for environment protection zones.

It appears that northern Sydney is not included in the list that makes up the 50% of parks and reserves that have any priority to improve biodiversity. This is despite parks such as Lane Cove National Park being in the top 3 most visited in NSW. Our local parks are under the most intense pressure from urban encroachment of weeds and polluted run off. The Government places value on local national parks only for their tourist and high impact recreation opportunities.

It is absurd to be to have a goal of protecting bushland and at the same time to be constructing bike loops through high quality bushland in national parks.

We urge you to lobby the NSW Government to place a priority on maintaining the quality of our beautiful local bushland by making a comment online

The Glade, Wahroonga Athletics Track Proposal:

Committee member Steve Procter reports on the latest Ku-ring-gai Council meeting that considered the Glade proposal.

On 20 March 2012 Ku-ring-gai Council made the controversial decision to grant Abbotsleigh and Knox Grammar a 12 month option to submit a development application to Council for the construction of a synthetic athletics training track and field at The Glade oval and reserve in Wahroonga, to be used by the private schools for training and coaching purposes.

In a decision that brought forth audible groans from members of Friends of The Glade present in the Council Chamber on the evening of the 20 March, five Councillors including the Mayor, voted to overturn the recommendation of their officers and the independent Clouston Report and instead seek a DA from

two schools seeking to develop a synthetic surface athletics track. The vote followed an (unsuccessful) call by the Deputy Mayor, Elaine Malicki, for fellow councillors to support the interests of the broader community. Those interests had been well articulated by earlier speakers on behalf of Hornsby, Ku-ring-gai and Hills District Cricket Association, Little Athletics Association, and Friends of The Glade (FOG). The outcome of a rescission motion to be considered at the next council meeting will be known when STEP Matters is read, however, the prospect of its success do not appear favourable.

The latest intervention, at the time of writing, by Dr Holly Parsons of Birdlife Australia, expresses concern at the interference that could be caused to a likely breeding spot for powerful owls recorded there during 2011.

STEP also received the following letter from a member:

> *I wonder how many STEP members are aware of the process that has been going on for the past year and a half, as Abbotsleigh and Knox apply jointly to Ku-Ring-Gai Council to approve a DA to add a synthetic running track and other facilities at The Glade oval and reserve for their own use, with the resultant takeover of the oval for the school's exclusive use at certain times and the attendant traffic problems in a residential area where the oval was not planned as a public sporting facility of that type.*
>
> *Despite a series of investigations and reports by the Council's management committee and an independent consultant, all of which recommended against allowing the DA, Council last night voted (a split decision decided by the Mayor's casting vote) in favour. The decision is still not a fait accompli and it is important that the details of this matter should be available to all members through the document attached, provided by "Friends of The Glade", a group of residents formed to fight the DA.*
>
> *Yours faithfully,*
> *Jenny Katauskas*

The following information has been taken from the Press Release issued by the Friends of the Glade that is referred to in Jenny's letter.

Friends of The Glade strongly believes that The Glade is a completely unsuitable site for full-sized natural or synthetic athletics facilities. It is an environmentally sensitive area, bounded by critically endangered Blue Gum High Forest and is totally surrounded by residential properties with limited access roads and parking. If the schools successfully obtain consent to develop The Glade to their own requirements, and subject to a proposed 21 year lease for use, they will be "rubberising" one of the last remaining natural park and bushland areas within our community in their on-going quest for the development of facilities.'

When independently assessed against Council's criteria for developing and funding an athletics facility for the whole community, The Glade has been shown to be a totally unsuitable venue. The consultant's assessment of The Glade was based on the very important criteria of access and circulation, character and use and environment and natural heritage. No equivalent athletics facility is located in such close proximity to a residential area across the whole of the greater Wollongong – Sydney – Newcastle region.

A subsequent attempt at a Council meeting on 20 April to pass a motion to cancel the Council decision failed.

STEP agrees with the views of the Friends of the Glade. The peaceful bushland character of this community recreational area will be ruined if this proposal goes ahead. Substantial earthworks would be required and water runoff from the increase in hard surface area is likely to have a harmful effect on the critically endangered blue gum high forest close to the site.

We invite the mayor, Jennifer Anderson to respond to the issues raised by The Glade Friends and our members

Further information can be obtained from Friends of The Glade at www.sites.google.com/site/gladefriends

NSW Pest Management Strategy

The National Parks and Wildlife Service (NPWS) is currently preparing new Regional Pest Management Strategies for weed and pest animal management of national parks and reserves across NSW to be implemented over 2012 to 2015. The metropolitan north east strategy can be found here: http://www.environment.nsw.gov.au/resources/pestsweeds/110894draftMetroNorthEastRPMS.pdf

As stated in the Department of Environment and Heritage website "The strategies aim to minimise adverse impacts of pests on biodiversity, protected areas and the community. The strategies achieve this through identifying and focusing on the highest priority programs, ensuring that actions are achievable and delivering measurable outcomes."

It is vital that the strategies include details of how the achievements of the strategy are to be measured. While it is usually impossible to eradicate weeds and feral animals from any given area, it will be possible to define the outcomes in terms of the proportion of an area affected by invasive weeds or number sightings of an animal over a specified period.

A general description of the issue of invasive species follows. It has been extracted from an article written by Dr Carol Booth, Policy Officer, Invasive Species Council, for the National Parks Association journal Nature New South Wales, Winter 2011. The full text, tables and references will be available from the STEP website.

Invasive Species in NSW

Sometime during 2008-2010, perhaps on a plant or shipping container or on a traveller's jacket, some tiny yellow spores slipped into Australia. Billions of these eucalyptus rust spores are now blowing around NSW infecting plants from our dominant plant family, the Myrtaceae. This recent invader could transform the Australian bush, threatening plants and dependent wildlife.

Invasive species (mainly foxes, cats and rats) have already eliminated many species from NSW (mainly mammals and island birds) and threaten hundreds more. More than 70% of NSW's listed threatened biodiversity is at risk from invasive species, a threat second only to land clearing (Coutts-Smith et al. 2007).

The most notorious invaders in NSW – foxes, cats, rabbits, goats, pigs, lantana, bitou bush, camphor laurel, for example – were introduced in the bad old days when there were no biosecurity laws to protect the environment and people were free to 'improve' Australia with whatever took their fancy: new game, garden plants and farming stock.

Now, we have national biosecurity laws designed to limit the flow of new species to those assessed as low risk. We have state laws under which species can be banned from trade and their control required. Under such laws, the notorious invaders of the past would not be permitted entry. But that doesn't mean the flow of new invaders into NSW has stopped. Far from it. New invaders keep arriving at an alarming rate both from outside and inside Australia, and as both accidental and deliberate introductions.

Escalating global trade and travel has greatly increased the risk of accidental incursions like those of eucalyptus rust and Asian honeybees (recently established in Queensland) and tramp ants (red imported fire ants and yellow crazy ants for example).

The fad for the new and exotic hasn't faded and people now have the internet and cheap airfares to facilitate the trade in illegal, or legal but high-risk, pets and plants.

There is a gaping hole in current national regulations for new varieties of existing invasive species that could exacerbate their damage. The importation of savannah cats – a cross between servals and domestic cats that are likely to be superior hunters – was stopped in 2008 when then environment minister Peter Garrett responded to public pressure to require their assessment. But other new unsafe breeds are freely imported. When Bengal cats – agile climbers that are a cross between domestic cats and Asian leopard cats – go feral, as they inevitably will, they could inhabit areas too wet for other cats and threaten a new suite of native animals. Farmers can import hardier new breeds of goats or pasture plants that will further degrade our trammelled landscapes.

But most future NSW invaders are already in cultivation, having yet to escape, or will come from elsewhere in Australia, mostly as legal introductions. Most states, including NSW, have an open door policy that permits the free flow of all but a few non-indigenous plants without a risk assessment. With 30,000 exotic plant species in Australia (more than there are native species), and only about 1% banned in

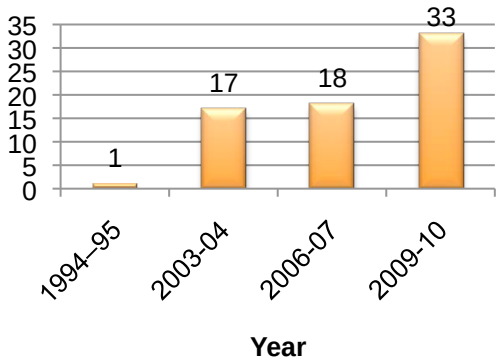
NSW, and no restrictions on the thousands of plants native to Australia but not NSW, the state's weed burden is guaranteed to grow rapidly. The number of plants reported as established (naturalised) in NSW has grown by an average 20 a year in the past two decades with the total now exceeding 1660, about 26% of the total NSW flora (Downey et al. 2010; Hnatiuk 1990).

The invasive multitudes already established in NSW should serve as the constant history lesson that it is environmentally and economically irrational to allow in new organisms without filtering out those likely to cause harm. A high reform priority in NSW should be to implement a permitted (white) list regime that restricts the introduction of new species and new varieties into NSW to those assessed as low-risk (Invasive Species Council 2009). Currently, there are no restrictions on introducing thousands of new plant species, including those weedy elsewhere. The current review of NSW's Noxious Weeds Act 1993 offers the opportunity to bring in this reform, and it is encouraging that the Department of Industry and Innovation has recommended its consideration.

The only way to protect many of NSW's precious places and threatened species is the continual containment and control of ineradicable invaders. Because of the large number of invaders and the many competing priorities for inadequate budgets this needs to be done using effective methods, engendering cooperation across tenures and in a prioritised way. The severity of these myriad threats warrants considerably larger budgets. The Prime Minister's Science, Engineering and Innovation Council advised that controlling invasive species is one of the most cost-effective ways to conserve biodiversity (Possingham et al. 2002).

In recent years, the NSW government has substantially increased funding for control programs in national parks (see Figure 1). Most parks have pest management plans and progress reports indicate solid gains in some areas. However, NSW's 2009 State of Environment Report states that 'the intensive control that is necessary to improve the condition of flora and fauna is largely limited to some conservation reserves.' Some control programs such as that for bitou bush have made progress and many bush rehabilitation groups with their stalwart volunteers are doing a great job in local areas. But overall, as the Local Government Association of NSW and Shires Association of NSW (2009) states for weeds, 'NSW is losing the fight'.

Figure 1: Funding for management of invasive species in NSW national parks



Sources: NSW State Government (2005; 2006; 2009)

One positive election commitment of the new NSW Government is to increase funding for noxious weed management, regeneration projects and control of invasive species in national parks (see http://www.nsw.liberal.org.au/policies/environmental-sustainability/controlling-noxious-weeds-and-improve-conservation.html). (*Editor's note: This weblink no longer works and it appears that this commitment has not been met as explained earlier)*

NSW's weed problems are being exacerbated by the failure to restrict new plantings of known weeds. Of 340 environmentally significant weeds recently ranked by NSW Government officers (Downey et al. 2010), about 90% can be traded in all or part of NSW, including 80% of those ranked a moderate to very high threat or potential threat. Continued sale increases risks of escape into new areas and the introduction of more-invasive varieties.

Greater even than the challenge of managing invasive species is the challenge of managing humans with their multitude of motivations for introducing and spreading unsafe organisms. One person on a bulldozer can do a lot of damage but far more harm can be done by planting something pretty in the garden, setting free an unwanted pet or desired hunting prey, planting a new crop or shifting a pot plant with hitchhiking bugs or pathogens. To address this multitude of actions and motivations, we need not only stronger laws and effective control programs but a cultural shift that recognises pets (especially aquarium fish), crops, and garden plants as live organisms with feral propensities and redefines freedom and choice to exclude actions that spread invasive species.

The environment movement has a vital role to play in promoting this cultural shift and elevating the political priority given to invasive species threats.

Bush Hazard – the Leech

Walkers in the bush around Sydney this summer have encountered the hazards created by an explosion in the leech population during this wet summer. Stringybark Ridge in Berowra Regional Park where STEP recently held a walk has been renamed "Leech Alley". We lost count of the number of these beasties that had to be removed.

The following article was contributed to the NPA NSW journal by Brian Everingham.

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Sometime during April one of our keen walkers wrote to me and asked what to do about leech bites. The pesky little critters had taken a liking to her blood and she was suffering the agonies of the itching phase that appears to occur a few days after the meal.

The email arrived at an opportune time. I was ensconced in the rainforest on the NSW/Qld border. Even though I had years of experience dealing with those leeches, coping with the itches and generally scratching myself from one walk to the next, and even though I had developed some strategies in avoiding them, there was little I could do in that environment but also share her agonies.

Leech bites are caused by creatures of the class Hirudinea[1], which may be of marine, freshwater, or terrestrial types. There appears to be no avoiding them! They are annelids which roughly means they are a form of worm, and like earthworms, leeches are hermaphrodites. Interestingly, most leeches do not feed on human blood, but instead prey on small invertebrates, which they eat whole. That might explain why a friend of mine who is an expert on amphibians and reptiles told me that in one waterhole he discovered a leech firmly attached to a tadpole!

Those leeches who do feed on blood can also be divided into categories. Some bite. Those in the Danum Valley in Sabah, Borneo, bite with a ferocity matching a wild dog! Most in Australia do not bite with the same ferocity and most people are not even aware that a leech has attached itself and had its fill until it drops off and the tell-tale blood appears. Leeches usually have three jaws and make a Y-shaped incision[2]. The Australian land leech has only two jaws and makes a V-shaped incision[3]. The leech uses an anticoagulant called hirudin and it continues to operate for some time after the leech had left the scene of its crime.

Now, apart from the messy business of spreading your own blood everywhere, the worst part of a leech bite is the itch. We were once advised to remove the leech by salt, cigarette lighter and/or insect repellent. That is now no longer the case. It is now thought that such means makes the leech to regurgitate its stomach contents into the wound and quickly detach. However, the vomit may carry disease, and thus increase the risk of infection. Apparently it is better to ease the finger nail or a flat object under the leech and break the suction, before flicking it away. I then use an antiseptic in the wound several times each day over the course of the next few days and I think it eases the itch.

I am now somewhat allergic to leeches. My intolerance of their bite seems to have increased over time. I therefore try to avoid them and when I was birdwatching in Fraser Hill on the Malayan peninsula I discovered that locals used a finely woven material like lawn and turn it into a knee length sock, worn over clothing and tied firmly at the top. If the sock is white or lightly coloured it is often easy enough to see the leech as it climbs up from your boots. Mind you, that did not protect me once when I was walking in Barrington Tops. There, the leech avoided the long climb by landing on me from above and firmly attaching itself behind my earlobe.

In the end, if you go walking, expect to be bitten by a leech. Deal with them calmly. Admire their beauty and considerable talent for survival, try to

[1] http://en.wikipedia.org/wiki/Leech

[2] http://australianmuseum.net.au/Leeches

avoid and then try to minimize the itch. But when you think about that walk, wasn't it worth it?

Book Review

John Burke has written the following review of Ian Lowe's latest book Bigger or Better? Australia's population debate, University of Queensland Press.

Professor Ian Lowe AO is a scientist, and has been president of the Australian Conservation Foundation (ACF) since 2004 and widely involved in matters environmental both nationally and internationally. He is a patron of Sustainable Population Australia. His views on population have been well known through speeches, articles and books.

Bigger or Better? is a significant contribution to our understanding of the environmental and social consequences of, and what is driving, ever-increasing population in Australia and we recommend it highly. Ian Lowe writes in a clear and somewhat understated style that eschews the strident prose and obvious anger that typifies much environmental writing, including at times that in STEP newsletters. So we get a well-reasoned argument that often looks at both sides of an issue in order to understand all the protagonists.

Lowe sets the scene by quoting the definition of sustainable development set in 1987 by the Brundtland Commission as 'meeting our needs without reducing opportunities for future generations.' He deals with the impact of larger populations on our resources. He successfully debunks the conventional wisdom that GDP growth comes mostly from increased population and that it always makes us individually wealthier. For instance he quotes a Queensland Government report in relation to the decade to 2007-08 where annual growth averaged 3% which came from an increase in the participation rate of .6%, and increase in productivity of 2.2 % with only 0.2% from the increase in the working age population in a state with rapid population growth.

The mathematics of stabilising the population are dealt with and, given current fertility rates, they show that we can stabilise Australia's population with a surprisingly high net migration intake. Regarding the story, heard so often, that growth is necessary for prosperity, Lowe notes that even the World Economic Forum recognises the 'impossibility of perpetual growth in a closed system' – what STEP refers to as the impossibility of 'infinite growth in a finite world'.

Lowe goes on to deal well with identifying the protagonists in the current Australian debate over population and with the politics surrounding the issue. Where he is not so strong is in his defence of the ACF's stance on population. He points to policies and papers developed over the years but touches only lightly on the failure of the ACF to really confront the issue. It has been almost impossible to find any reference to population in any of the Campaign updates in the ACF journal *Habitat* or elsewhere. The campaigners write their reports without reference to what is often the greatest threat to whatever they are campaigning for. The April 2008 article on the proposed Traveston Crossing dam neglected any mention of population growth which was the sole reason for the dam proposal. The ACF alternative to the dam was demand management and modular desalination plants! (See STEP Matters No 144, p8) However, the arrival of the wonderful Charles Berger at he ACF some years ago, and events such as the publication of this book, will no doubt produce further change for the better.

Professor Lowe is a powerful voice for better environmental and social policies and outcomes in Australia and *Bigger or Better?* skilfully progresses those ideals.

Atmospheric Rivers

STEP Committee member, John Martyn has written the following article that explains the phenomenon of atmospheric rivers that we experienced in March leading to major flooding in the central west and the Murrumbidgee areas of NSW.

In November 2009 a huge deluge brought massive flooding to the north-west English county of Cumbria. 314 mm of rain fell in 24 hours, the heaviest 24 hour fall anywhere in England since formal rainfall records began in 1727. That such a fall broke records might surprise many people here, who are very aware of the way the British constantly complain about their rainy weather. But that sort of rainfall intensity is more typical of eastern and northern Australia and quite different to the usual dreary, wind-blown, drizzly stuff that dampens the days and interupts the cricket over there.

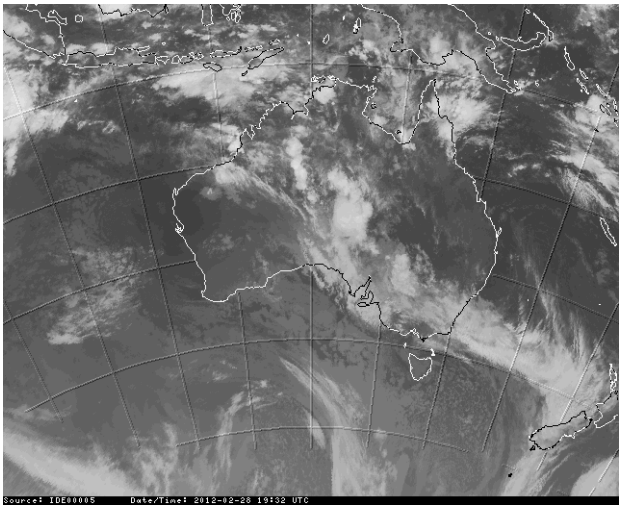
Meteorologists now have excellent evidence that the Cumbria rain event of 2009 was triggered by a stream of moist air that poured from the tropical corners of the North Atlantic well to the south-west of the British Isles. They even have a name for such a stream – an "atmospheric river" (introduced in 1994 by Yong Zhu and Reginald Newell in a paper in *Geophysical Research Letters*). Such Rivers, thousands of kilometres long but only a few hundred wide, are now believed to carry most of the moisture that leaves the tropics to pass across mid-latitudes to feed the temperate weather systems. They are critical moisture pathways, feeding the polar frontal systems and triggering lows, and have been compared to the Amazon in the volumes of water that they can carry.

You will find very little reference to the actual term atmospheric river in Australia, but there is lots of evidence that similar phenomena exist. For example, the infrared satellite image from February 29th this year (below) shows a stream of heavy cloud flowing south-eastwards from the monsoon trough of the tropics, via a low-pressure trough across south-eastern Australia. It streamed far out across the Tasman where it merged with a cold front approaching New Zealand. You can also see that it disappears off the image at around 55º south, still a strong band of cloud. Well, that image wasn't of any old cloud band, it was of the weather system that brought the recent massive flooding to Victoria, southern NSW and the Murumbidgee River. The 24 hour rainfall totals were on a par with the Cumbria event, and there were strong parallels in the direction of flow of the moisture which was almost a mirror image to that which fed the Cumbria floods.

Serious flood events in the western US have also been shown to be sourced by such streams of tropical moisture. One atmospheric river that intermittently crosses the Pacific, in a north-easterly direction from the vicinity of Hawaii, has (only half-jokingly) been named the "pineapple express".

The "rivers" are usually measured professionally by satellite as water vapour anomalies and there are plenty of coloured images of them on the web for the North Pacific and North Atlantic, such as in www.esrl.noaa.gov/psd/atmrivers/questions/. Australian weather-watchers can distinguish some of them as cloud bands streaming across the continent in a south-easterly direction from time to time on the infrared satellite images of the Bureau's website, such as www.bom.gov.au/products/IDE00900.loop.shtml and www.bom.gov.au/products/IDE00902.loop.shtml And there are lots of other interesting and informative websites that will pop up if you Google terms like "atmospheric river", "Cumbria floods" or even "pineapple express".

And will they increase in intensity with climate change? Well nobody knows for sure; but many experts believe they will almost certainly be boosted by the anticipated increase in evaporation from the tropical oceans.



Wacky Weather and Climate Prediction

Andrew Watkins *is Manager of Climate Prediction services at the Bureau of Meteorology.*
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"Prediction is very difficult. Especially about the future," – so said Neils Bohr, Danish physicist and 1922 Nobel Prize winner.

And you know what? I think he was onto something, especially when it comes to seasonal climate outlooks.

In the past 12 months we've seen – as Today Tonight likes to describe it when they interview me and my colleagues from the Australian Bureau of Meteorology – truly wild and wacky weather.

But no-one tells you that wackiness is a combination of weather and climate. And that despite all the calls for a precise weather forecast for everyone's town/farm/dam many months in advance, it will never be possible. Why?

Well, first of all, let's get the weather and climate thing sorted. As the saying goes: climate is what you expect, weather is what you get. And indeed that's pretty much it – climate is just the averaging of weather over time.

But when it comes to climate forecasts – in this case we're talking about seasonal forecasts – there are some fundamental differences between what you can do for weather and what you can do for climate.

Predicting weather and predicting climate are actually quite separate beasts. Sure, they both use stonking big computers and telephone-book-thick reams of Fortran code (yes, Fortran, for those sniggering up the back – it's still the fastest floating point arithmetic language). But the divergence is in how the forecasts are made.

Climate is all about forces. Not 'F=ma' type force, but rather a push towards one state (such as wetter and cooler over Australia) or another. Think of the sun – that's your classic climate driver.

As it moves from overhead in the northern hemisphere to overhead in the southern hemisphere it 'forces' a change in the climate. Hence the seasons we get each and every year. In fact, you could say the calendar on your wall is your very own climate model.

So when it comes to producing a seasonal climate outlook, the important things to look at are the climate drivers. The big ones for me and my colleagues are the oceans, as they store a massive amount of heat (and 'evaporable' moisture), and will in turn force the atmosphere to respond one way or another.

So, for a climate forecast, we ask: 'Is the Pacific Ocean warmer or cooler than normal?' In other words, do we have El Niño, neutral or La Niña? Are the sea surface temperatures around Australia warmer or cooler? What's the state of the Indian Ocean? All these factors (and more) will try and force the atmosphere to alter slightly from its mean state.

These drivers and their strength are known as the 'boundary conditions', because they set the limits of what's possible over the season ahead.
Look at what happened in the 2010 wet season. Late in the year the Coral Sea was very warm – typical of a La Niña – which nudged the region considered 'favourable' for tropical cyclone development closer to the Queensland coast. The result? Tropical Cyclones Tasha, Anthony, then the biggie, Yasi all did their darndest to ruin the sunshine state's summer.

To highlight what a boundary condition can do, tropical cyclones have only ever crossed the Queensland coast multiple times in the one wet season during La Niña events.

So what about weather forecasts?

With a weather forecast, while it's important to have the boundary conditions about right, the most important things are your initial values. This is the data you plug into the model from every single spot you can get your hands on.

Manual observations, satellites, floating buoys, aircraft, ships, automatic weather stations, ocean gliders, radars, weather balloons – all of it goes in to paint an extremely detailed picture of the three-dimensional current state of the atmosphere and its weather at a precise time.

Now the weather, being a chaotic beast, any little errors in these observations have the potential to become big ones – it's like the butterfly flapping its wings in the Amazon causing a cyclone over India a week later.

That's stretching it a bit, but fundamentally that's what chaos theory says can happen: a cascade of ever-increasing errors/impacts.

Hence if you have your physics right (just as for a climate outlook) and you have really good initial conditions, the 'chaos' (or the explosion of the errors) is minimised for a few days and we can get really good forecasts on small time and space scales.

But this will only last a few days. Typical accuracy is about a week, or approximately the time it takes to cycle from one weather pattern to the next. Beyond that, the atmosphere 'forgets' what happened a week ago and starts to head down its own merry path.

So if it's a billion-to-one to predict exactly what will happen on a particular day in a few months time, how can we trust a seasonal forecast? Well, a colleague of mine came up with a great analogy.

Take one hammer. Take one vase. Bang 'em together. What will you get?

The drover's dog could tell you the answer is a smashed vase. (That's the climate-forecast bit; the known forces/drivers/boundary conditions have given a very predictable, general, result: an ex-vase.)

But Professor Bohr's wisest owl couldn't be expected to tell you where every single shard of pottery will land. That's nigh-on impossible (well, unless you knew the exact location and force on every particle in the universe). Not being able to predict where every piece will land doesn't discount the fact the hammer is the natural enemy of the vase.

Similarly, just because you can't predict exactly where rain will fall on a particular Thursday in five weeks' time (or even five days' time), that doesn't mean we can't predict what will generally happen that month or season.

Playing with probabilities

Any decent climate outlook worth its Fortran code will be given as a probability. Why?

Research shows us that, at best, only about 70 per cent of our year-to-year seasonal climate is predictable; the other 30 per cent is chaotic random (weathery) stuff. (It must be one of the few fields where you expect to be wrong occasionally and just have to cop it.)

A typical climate forecast will calculate that there's a 60 per cent chance of more rain than normal in a general region next season. Does this help?

Well, we know that hedging one way or another, over time, will let you win in the end.

Think of it this way – a European roulette wheel has one '0', 18 red and 18 black slots. If you only bet one colour and the payout is double for a win, the casino would still win in the end because they have the 0. (In reality, when odds and payouts are taken into account, a casino has about a 2.7 per cent edge). The casino knows it will always make a profit if the game is played often enough.

Climate forecasts give you far better odds that 2.7 per cent and, used wisely over a period of time, will give an edge and ultimately a win overall.

And in a changing climate, an edge is what we all need.

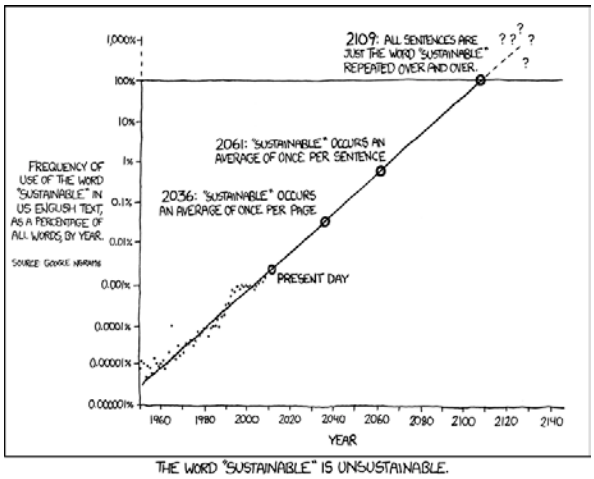
Which leads me to proclaim the following: "Prediction is very difficult, especially about the future, but at least we have stonking great computers to sway the odds." Andrew Watkins, 2012. (Don't think that will win me a Nobel Prize though.)

Pricing a sustainable future

Paul Burke is a Research Fellow at the Australian National University's Crawford School of Economics & Government. This article was originally published on The Conversation – *theconversation.edu.au*

A recent cartoon (below) extrapolates the use of the word "sustainable". It predicts that in 50 years each sentence will on average contain the word at least once.

The cartoon is clever, and "sustainable" is indeed overused. But there is a good reason why we hear about sustainability so much these days. It is important.



Too much sustainability? xkcd.com

Despite the odd hiccup, and ongoing deprivation in some regions, we seem to have by and large worked out how to get richer. But can the planet handle the strain on its resources?

The United Nations Secretary-General's High-Level Panel on Global Sustainability released its report, "*Resilient People, Resilient Planet: A Future Worth Choosing*", last week.

The panel is composed mostly of political leaders, and has global representation. One of the members is Australia's foreign minister, Kevin Rudd.

A broad vision

Despite the panel's name, its recommendations really relate to sustainable development rather than the narrower concept of sustainability (the ability to endure).

The report includes 56 recommendations. While it is unlikely that the panel's goals will all be reached ("universal broadband by 2025"), its ambition is commendable.

The panel makes a number of quite standard, but important, points about sustainable development. It calls for more research and development in agriculture and energy to reduce these sectors' environmental impacts and alleviate food and energy poverty.

It also notes that helping poor families to access health and education services improves their lives, and can relieve pressure on the environment from population growth.

Getting prices right

The report's primary message is that we need to do much more to get prices right. Markets work well when goods and services are properly priced. But no price will naturally emerge for carbon dioxide emissions or many of the benefits provided by natural ecosystems.

The playing field is heavily biased against the natural environment.

The panel recommends emissions pricing as the most sensible way to slow climate change and address other environmental issues.

The report also takes up the case against fossil fuel subsidies, which are in effect a negative carbon price. These subsidies are also a large drain on government budgets in many countries.

Environmental challenges are vast. But until we allow prices to properly mobilise the power of the private sector to confront them, it is too early to give up hope.

The panel has a dig at mainstream economics, which it suggests needs to open its eyes more fully to sustainability.

This critique has some validity. Some strands of economics do tend to overlook environmental impediments to improving living standards. But economics should not be seen as the bad guy. The report's principle philosophy of getting prices and rules right and then letting the market work is straight from Microeconomics 1.

Inspiring, but diplomatic

The panel's report is designed to inspire. Its release is part of the lead-up to the Rio+20 United Nations Conference on Sustainable Development, which will be held in June 2012. As a United Nations document, it is no surprise that the report is diplomatic in tone. It does not

berate any individual countries for their current policies. It instead highlights positive initiatives underway around the world.

The report also sidesteps discussion of just how challenging sustainability reforms can be. As our experience with moving to carbon pricing here in Australia has shown, vested interests can put up a strong fight.

Addressing a key global injustice

The report talks a lot about poverty reduction, but mentions the Doha Round of trade negotiations only once. This is not enough.

Removing agricultural subsidies and trade barriers in developed countries is one of the most powerful options available to advance the development agenda in Africa and elsewhere. Yet progress toward reducing agricultural distortions has stalled, in Europe and elsewhere. Until trade-protecting developed countries improve the fairness of global agricultural markets, these countries' professed support for plans for global poverty reduction should be called what it is: a bit rich.

The paradox of growth

…and continuing on the sustainability theme (or lack thereof), Ross Gittins writes about a recent report published by the OECD on the environmental outlook. Ross Gittins is the Sydney Morning Herald economics editor. This article that appeared in the SMH on 21 March 2012

Sidelining environmental concerns in our pursuit of economic growth will one day leave us far less well off. Ross Gittins reports.

Do you ever wonder how the environment - the global ecosystem - will cope with the continuing growth in the world population plus the rapid economic development of China, India and various other "emerging economies"? I do. And it's not a comforting thought.

But now that reputable and highly orthodox outfit the Organisation for Economic Co-operation and Development has attempted to think it through systematically. In its report Environmental Outlook to 2050, it projects existing socio-economic trends for 40 years, assuming no new policies to counter environmental problems.

It's not possible to know what the future holds, of course, and such modelling - economic or scientific - is a highly imperfect way of making predictions. Even so, some idea is better than no idea. It's possible the organisation's projections are unduly pessimistic, but it's just as likely they understate the problem because they don't adequately capture the way various problems could interact and compound.

Then there's the problem of "tipping points". We know natural systems have tipping points, beyond which damaging change becomes irreversible. There are likely to be tipping points in climate change, species loss, groundwater depletion and land degradation.

"However, these thresholds are in many cases not yet fully understood, nor are the environmental, social and economic consequences of crossing them," the report admits. In which case, they're not allowed for in the projections.

Over the past four decades, human endeavour has unleashed unprecedented economic growth in the pursuit of higher living standards. While the world's population has increased by more than 3 billion people since 1970, the size of the world economy has more than tripled.

Although this growth has pulled millions out of poverty, it has been unevenly distributed and has incurred significant cost to the environment. Natural assets continue to be depleted, with the services those assets deliver already compromised by environmental pollution.

The United Nations is projecting further population growth of 2 billion by 2050. Cities are likely to absorb this growth. By 2050, nearly 70 per cent of the world population is projected to be living in urban areas.

"This will magnify challenges such as air pollution, transport congestion, and the management of waste and water in slums, with serious consequences for human health," it says.

The report asks whether the planet's resource base could support ever-increasing demands for energy, food, water and other natural resources, and at the same time absorb our waste streams. Or will the growth process undermine itself?

With all the understatement of a government report we're told that providing for all these extra people and improving the living standards of all will "challenge our ability to manage and restore those natural assets on which all life depends".

"Failure to do so will have serious consequences, especially for the poor, and ultimately undermine the growth and human development of future generations." Oh. That all?

Without policy action, the world economy in 2050

is projected to be four times bigger than it is today, using about 80 per cent more energy. At the global level the energy mix would be little different from what it is today, with fossil fuels accounting for about 85 per cent, renewables 10 per cent and nuclear 5 per cent.

The emerging economies of Brazil, Russia, India, Indonesia, China and South Africa (the BRIICS) would become major users of fossil fuels. To feed a growing population with changing dietary preferences, agricultural land is projected to expand, leading to a substantial increase in competition for land.

Global emissions of greenhouse gases are projected to increase by half, with most of that coming from energy use. The atmospheric concentration of greenhouse gases could reach almost 685 parts per million, with the global average temperature increasing by 3 to 6 degrees by the end of the century.

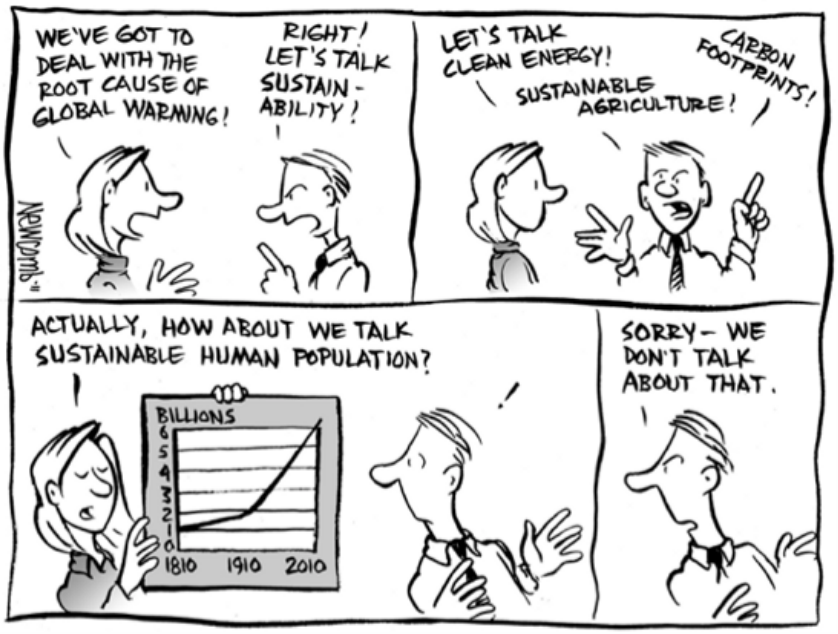
"A temperature increase of more than 2 degrees would alter precipitation patterns, increase glacier and permafrost melt, drive sea-level rise, worsen the intensity and frequency of extreme weather events such as heat waves, floods and hurricanes, and become the greatest driver of biodiversity loss," the report says.
Loss of biodiversity would continue, especially in Asia, Europe and southern Africa. Native forests would shrink in area by 13 per cent. Commercial forestry would reduce diversity, as would the growing of crops for fuel.

More than 40 per cent of the world's population would be living in water-stressed areas. Environmental flows would be contested, putting ecosystems at risk, and groundwater depletion may become the greatest threat to agriculture and urban water supplies. About 1.4 billion people are projected to still be without basic sanitation.

Urban air pollution would become the top environmental cause of premature death. With growing transport and industrial air emissions, the number of premature deaths linked to airborne particulate matter would more than double to 3.6 million a year, mainly in China and India.

With no policy change, continued degradation and erosion of natural environmental capital could be expected, "with the risk of irreversible changes that could endanger two centuries of rising living standards". For openers, the cost of inaction on climate change could lead to a permanent loss of more than 14 per cent in average world consumption per person.
The purpose of reports like this is to motivate rather than depress, of course. The report's implicit assumption is there are policies we could pursue that made population growth and rising material living standards compatible with environmental sustainability.

I hae me doots about that. We're not yet at the point where the sources of official orthodoxy are ready to concede there are limits to economic growth. But this report comes mighty close



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