



STEP Matters

Number 157, October 2010

In this final issue for 2010 we:

- Highlight Dr John Martyn's new *Field Guide to the Bushland of the Lane Cove Valley*.
 - Learn why it is time Australia acted on carbon pricing.
 - Report on our activities over the past twelve months.
 - Experience at first hand the recent greening of the outback.
 - Understand better the importance of biodiversity.
- Read about how Sydney sandstone got its colour bands.
 - Find out about the possibilities of using algae to clean up nutrients from urban stormwater.
 - Discover just how many species there are on earth (we think).
 - Plus much more besides.

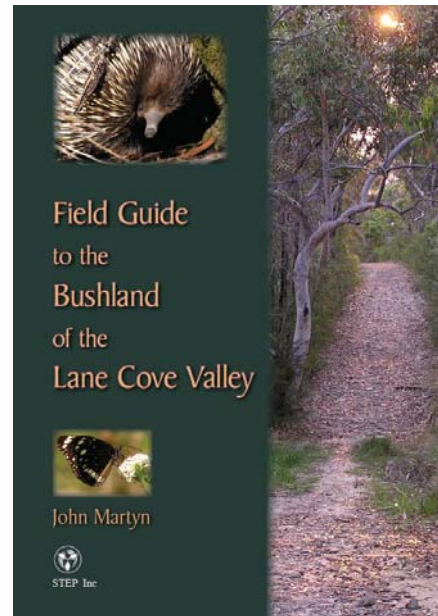
Finally, let me be the first to wish all STEP members a safe and joyful festive season!

Just released in time for Christmas!

The long awaited and extensively revised new *Field Guide to the Bushland of the Lane Cove Valley* by Dr John Martyn will be available for sale in early December. This is the first time this iconic Australian publication, first published in 1994, has been revamped and updated. The new hard cover *Field Guide* is now in full colour and runs to 256 pages.

The contents have been reviewed by experts and augmented with many new entries, making it the most authoritative publication of its kind in this region. The price of the new *Field Guide* to STEP members is \$35.00, which is a significant discount to its public price of \$45.00.

Published by STEP, all profits will go to aid our environmental conservation and education efforts. Copies can be ordered from our web site or on the order form on the back of this edition of STEP Matters.



STEP end of year BBQ

STEP invites all members to our usual end of year get together to be held from 4.30pm on Sunday 12 December in the park behind Leuna Avenue at the end of Broadway at Wahroonga. Harry and Neroli Lock will once again supply the barbeque fire and hot water but please BYO everything else.

This is always one of the very best opportunities to meet other STEP members and we hope to see many of you there.

In the event that the weather looks really threatening call Neroli Lock on 9484 5794.

STEP Inc

Community-based Environmental Conservation since 1978

PO Box 697, Turramurra, NSW 2074

secretary@step.org.au

www.step.org.au

ABN 55 851 3472 043

Key Issues and Updates

STEP AGM

The STEP AGM last week attracted one of the largest attendances at a STEP meeting in recent years. While your editor would like to believe that this was simply an enthusiastic endorsement of the work of the STEP Committee (see Annual Report on page 4), it probably had more to do with the speaker for the evening, NSW Opposition Leader Barry O'Farrell. His address attracted considerable coverage in the local media, particularly his comments concerning targets for new dwellings in the Ku-ring-gai and Hornsby areas. While STEP shares community concern on that issue, we were perhaps more dismayed that the underlying issue of population growth was put in the too hard basket as "we cannot control immigration or birth rates". We continue to look to our political leadership at all levels to take a principled stand on the need for population stability, and continue to experience disappointment at their level of real disinterest.

St Ives Showground and Precinct Lands

STEP members would be aware that we have been part of a community consultation process set up by Ku-ring-gai Council (KMC) to help to establish a long term plan for the future use of the St. Ives Showground area. STEP has made several site visits to the area and has as a result submitted several detailed submissions. We are in many ways supportive of the Draft Options which emerged from this process, and which were endorsed by Council in June with approval to commence preparation of a draft Plan of Management for the Precinct. However, we have had no satisfactory response from KMC about our concerns for the future level of real protection for the Duffys Forest vegetation community. STEP has therefore once again raised this matter formally with KMC, pointing out that in our view some their proposals constitute Key Threatening Processes to the endangered ecological community of Duffy's Forest under Schedule 3 of the Threatened Species Conservation Act 1995. We have since also met with Deputy Mayor Jennifer Anderson to explain our concerns in more detail. We await a formal response from KMC.

Lane Cove National Park Budget

In our last issue we mentioned that local media had reported on a significant reduction in the

real operating budget available to fund essential conservation work in the Lane Cove National Park (LCNP). STEP has taken up the matter with LCNP management, who have confirmed that State Government imposed "efficiency cuts" and increased salary costs have cut operating budgets across LCNP and nearly all similar national parks. While an additional "one off" top up budget allocation for 2011 has now allowed LCNP to continue to fund some existing regeneration and conservation related contracts, this is unlikely to be repeated in future years. Indeed, the future funding arrangements for all national parks seem likely to depend upon a desperate search for grant funding and corporate sponsorship to fund essential conservation projects. It seems that the recent relaxation of NSW legislation to allow commercial tourism developments inside national parks (including wilderness areas) could become a convenient funding mechanism to cover such budgetary shortfalls. STEP will continue to work with LCNP to develop a long term plan of management designed to enhance the conservation values of the national park. We are however fearful that the need for additional revenue will see commercial and recreational considerations gradually replace conservation as the primary responsibility of our national parks. This would indeed be an ecological disaster.

NSW Mountain Bike Discussion Paper

STEP has been an active participant in the ongoing community debate about the construction of both legal and illegal tracks and trails in our local bushland for the use of mountain bikers and others. All members would have received a recent copy of our Position Paper on this matter. STEP has now been invited by the Department of Environment, Climate Change and Water (DECC) to provide comment on their recent discussion paper on mountain biking in the states national parks and reserves.

We also recently emailed STEP members to invite them to submit their own comments on this matter. You have until 26 October to do so at <http://nsw.gov.au/shapeourstate> or email mountain.biking@environment.nsw.gov.au (email copy your local MP as well).

The STEP submission, once completed, will be posted on our exciting new web site www.step.org.au. (See our newsletter in colour!)

Too late for Australia to 'go-it-alone' on carbon pricing

Article by Peter Wood and Paul Burke. Dr Peter Wood is a Postdoctoral Fellow and Paul Burke is a Research Fellow at the Australian National University's Crawford School of Economics & Government.*

Sections of Australia's business community and the federal opposition are concerned that we might 'get ahead of the rest of the world' by adopting a carbon price. But like a schoolboy judging the best time to join in at the school dance, there are dangers to waiting too long.

It would be very difficult for Australia to sell itself as an early mover on carbon pricing. Finland and the Netherlands introduced carbon taxes a full two decades ago, followed closely by Norway, Sweden, and Denmark. The world's most comprehensive carbon pricing scheme – the European Union's emissions trading scheme – was introduced in 2005. Others in our region are also taking steps toward carbon pricing. New Zealand has an emissions trading scheme. Japan, which has an emissions trading scheme operating in Tokyo, is drafting plans for a comprehensive scheme to come into effect from 2013. South Korea has passed a law mandating a cap on emissions, and is working on legislation to make this cap operational. China is planning to trial carbon pricing mechanisms. India already has a small tax on both mined and imported coal.

Although the United States is yet to pass national legislation, state-based approaches to carbon pricing are expanding. Ten north-eastern states operate the Regional Greenhouse Gas Initiative emissions trading scheme. Eleven states and provinces in the United States and Canada are due to commence emissions trading under the Western Climate Initiative in 2012. A further seven states and provinces are developing an emissions trading system under the Midwestern Greenhouse Gas Accord.

As in the United States, a policy vacuum at the national level has seen Australian states implement their own emissions reductions schemes. The NSW government, for instance, has operated a Greenhouse Gas Reduction Scheme – via which electricity generators gain tradable abatement certificates for project-based emissions reductions – since 2003. Most economists agree that introducing a national carbon pricing mechanism is the most important economic reform challenge currently facing Australia. As for the tariff reductions in the 1980s, there are vested interests rallying against reforms. Strong leadership is required to see through reforms that are in the national interest.

Reducing Australia's carbon emissions will involve costs, and our leaders should be honest about that. Commentators have in particular raised concerns about higher electricity prices. But money raised from a carbon price can be transferred to households through the tax and welfare systems. The poorly-understood Carbon Pollution Reduction Scheme would have transferred more money to most households than they would have had to pay in higher prices.

The risk for Australian business is not that we will get too far ahead of the rest of the world on climate policy – it is far too late for that. Instead, the risk is that the absence of a carbon price in Australia will lead to us missing out on new green growth opportunities. Australia could also miss out on the opportunity provided by carbon price revenues to reduce other taxes. Delays in carbon pricing would expose Australian industry to the potential of trade penalties, and would jeopardise any chance of us meeting our 2020 emissions reduction target. Delays would also increase the eventual cost for the Australian economy of transitioning to a low-carbon economy, and would extend the current uncertainty faced by investors in the electricity sector.

Alternative approaches to climate change mitigation – such as Tony Abbott's direct action plan – would impose higher costs on Australian households and businesses. Such alternatives would also not be able to be scaled up to meet more demanding emissions reduction targets in the future, except at considerable expense.

The time to act on carbon pricing in Australia has arrived. The new political arrangements in Canberra provide a good opportunity for the establishment of a carbon pricing system during the term of the current government. Let's hope that, irrespective of whether our politicians choose an emissions trading scheme, a carbon tax, or some type of hybrid scheme, a broad-based mechanism that appropriately prices carbon emissions is introduced quickly – and without the unnecessary waste of the Carbon Pollution Reduction Scheme industry handouts.

** A version of this article was first published in the Canberra Times.*

STEP Inc Annual Report for the year to October 2010.

STEP continues to perform strongly, with a focus on those local and national issues which we believe are important and to which we believe our activities can make a real difference. These matters have all been well covered in our newsletter, STEP Matters, copies of which are to be found on our web site www.step.org.au. I will today therefore only deal with these in overview.

Committee: STEP continues to benefit from an effective and well credentialed committee. We generally meet monthly and more often if required. We were fortunate to have two new members join the committee during the year. Steve Procter is a long time STEP member, bush regenerator and bush walker and he will be assuming the role of Treasurer after the AGM. Jill Green is a relative newcomer to STEP and brings both excellent environmental and business qualifications to the Committee. I would like to extend a warm welcome to both of them.

Apart from one resignation, the committee of 2010 will remain unchanged after the AGM. The continuity this ensures will help STEP to deliver cohesive future policy. I would however like to urge all members consider nominating for the Committee in future, as we are always on the look out for fresh ideas and talent.

Jim Wells: It is with great regret that the committee bids farewell to Jim Wells, who has filled the role of Treasurer with great dedication and skill over many years. Our current very sound financial situation is due to a number of factors, not the least of which has been Jim's extremely safe husbanding of STEP resources. Fortunately, Jim has indicated that he will retain an active interest in STEP, and will remain available to provide assistance to our new Treasurer if required.

Accounts: STEP continues to enjoy a sound financial position, in part due to the profitable sale of our publications and also to subscriptions from our solid membership base. We also benefit from receiving a steady flow of generally small but valuable donations. This year we would particularly also like to acknowledge the receipt of a \$5000 grant from the Turrumurra Community Bank (Bendigo Bank), to assist with the expenses of producing a revised and enlarged edition of the iconic 1994 STEP publication "*A Field Guide to the Bushland of the Upper Lane Cove Valley*". We will finance the remaining bulk of the production costs of the publication from STEP reserves.

Secretarial: While I have acknowledged the contribution from our entire Committee, I would like in particular to mention the untiring efforts of our secretary, Helen Wortham. Helen makes sure that our membership records, event organisation, publication sales and much, much more are handled in a smooth and timely manner. She is also the editor in chief of many of our publications, including our recent Position Paper on bushland tracks and trails, the upcoming new edition of our Field Guide and our just released new web site.

Grants: We continue to support the Young Scientist awards but some while ago decided to no longer support, with grants, local schools who wished to invest in environmental projects. This arose due to continuing difficulty in attracting good applications for such projects. Instead we last year decided to explore other options to get our message into the school age group, including helping to run a competition with the 350.org to encourage school children to understand the importance a CO2 target of 350 parts per million. This project too seems to have delivered disappointing outcomes, and so we are now engaged with the bicyclensw in discussions to use their schools education programme to deliver a message of environmentally responsible bike riding in bushland areas.

Bushwalks: This year we organised an active programme of monthly bush walks for both experienced and recreational bush walkers. STEP is already well known for its series of maps of the various walking trails stretching from Middle Harbour all the way to the top end of Lane Cove Valley. Our walks programme now provides a guided practical alternative for those who do not belong to organised walking groups. Bush walking is an activity which attracts interest from all age groups and is proving to be an excellent educational medium as well as helping to attract new members to STEP. Our thanks go to Robert Bracht, Andrew Little, John Martyn, Tim Gastineau-Hills and Jim Wells for organising and leading these walks.

Talks: We organised three public talks during the year, the topics of which all addressed key environmental issues. Our intention is to both educate and to question prevailing wisdom in key areas, as indeed does the topic following tonight's AGM. This year we also tried a new Q&A type format for the release of the *STEP Position Paper* on bushland tracks and trails. As a result, we believe that the format is suitable for use in cases where active community engagement is desired. Attendances have been

good and an ambitious programme for 2011 is being planned.

Newsletter: Our newsletter, *STEP Matters*, continues to be our prime method of communicating with our members and also with local councillors, politicians and other like minded groups. We publish five editions per year and we have seen these grow in size as we try to cover a greater range of both local and national issues. We would like to receive more direct feedback from our members, but we know that the newsletter is well regarded in conservation circles and helps to maintain the high profile of the STEP brand. Past copies can always be found on our web site.

Digital: Last year we made mention that STEP intended to increase its use of electronic communication to deliver new and quicker services to our members, including a re-vamped web presence, email reminders of upcoming events, STEP campaigns and urgent updates on key issues. The redesign of our web site has taken longer than we anticipated but I am delighted that it is now up and running. Please let us know what you think of it. It is information rich and is targeted not only at existing STEP members but at all in the community who believe that we need to plan within a long term environmental framework if we are to prevent the current tyranny of short term decisions destroying, piece by piece, our remaining natural bushland areas and biodiversity.

Issues: The issues that STEP consider important are fully covered in the newsletter on our web site. Many are of a local nature, particular to our northern Sydney region. Most however are issues of substance that concern Australia nationally and internationally. There is little point in rehashing them here, save to say that they will all require solutions that will go to the core of the way we live and work.

They do however have a common and continuing theme, which bears repetition from this same report last year and for which we do not apologise. Namely, that we cannot continue to hold as true the view that we can sustain an economic model that is predicated on the assumption that infinite growth is forever possible in a world of finite resources. A restructuring of the global economy is needed, and in fact has already begun, with renewable energy and resource recycling at last beginning to gain momentum, albeit still too slowly. The desperate defensive battles of the sunset industries such as coal mining will inevitably delay this process, aided and abetted by Governments who do know better but who are too faint hearted to provide the needed long-term leadership.

A key characteristic of the successful economy of the future will be population stability, yet the political leadership of our main parties displayed a disinterest in and lack of understanding of the challenge in the weeks running up to the recent election. Both parties seem oddly proud of the fact that the country is sleepwalking to population disaster with one of the highest rates of growth of any country on earth. New Prime Minister Julia Gillard, while opportunistically dumping Kevin Rudd's "Big Australia" policy during the election campaign, has not put forward a plan that would produce any different result.

Good News: As an environmental campaigner, STEP tends to highlight issues of concern and we make no apologies for so doing. However, we also celebrate good news, without claiming all of the credit! In this category, we regarded the environmental outcome of the protracted planning deliberations on the proposed redevelopment of the SAN to be a victory for the community, with the amount of bushland to be protected nearly trebling in size from that originally proposed (but expect more traffic chaos!) We feel that our twenty year crusade to highlight the issues associated with exponential population growth have finally started to get some public grip.

Our involvement with the contentious issue of mountain biking in local bushland has demonstrated that there may be a sensible middle ground, but the capacity for State and Local Government to properly execute any such strategy remains a cause for concern. The Tillegra Dam seems now to be generally recognised as being the planning disaster we labelled it some while ago, and hopefully will not go ahead. The tedious progress on the St Ives Showground Precinct proposals at least seems to carry some promise of a sensible outcome. The recent decision by Hornsby Council to block new trail construction through pristine bushland areas such as Dog Pound Creek is to be applauded, but we are alert to possible round two back sliding.

Publications: STEP's various maps and books continue to enjoy consistent sales and bring in much needed revenue for the organisation. This year has seen the completion of the revised *Field Guide to the Bushland of the Lane Cove Valley*, which has been a mammoth job on the part of a dedicated team, led by author John Martyn. John's hard work, dedication and enthusiasm continue to astound us all and we again thank him for his efforts. Hard copies of the new book are expected to be available from late November, well in time to make the very best possible Christmas present for the person

who has everything. The official launch of the new book will take place next February.

STEP also produced an authoritative *Position Paper on Bushland Tracks and Trails*, under the direction of Robin Buchanan, which we believe will go a long way to establishing a sensible frame work for the ongoing debate on this contentious issue. Our thanks go to Robin for her well targeted contribution.

The Year Ahead: It is our joint challenge for 2011 and beyond to focus the minds of all of our elected leaders on the real long-term environmental challenges facing both Australia and the world at large. STEP remains non political and will continue to question conventional wisdom where we believe that it is deficient and self-serving. STEP will also continue to address the wide range of local environmental concerns, including making

detailed fact based submissions on key issues where required. We are fortunate to have well credentialed resources available to us to conduct our work at such a high level, but we are always on the look out for new talent. Our member numbers comfortably exceed 400 and continue to grow, albeit more slowly than we would like, despite various membership recruitment activities. Our best recruiters however remain our current STEP members; we ask that you all invite your friends to join STEP.

In conclusion: We thank our members for their support of STEP and the various issues with which we became involved during the year. The campaigns led by STEP often make a substantial positive difference to the quality of the planning decisions ultimately handed down, even if we do not always get one hundred percent of what we want. We look forward to continuing to make a real difference in 2011

Being green in the outback. *Article written by STEP Committee member Robin Buchanan.*

I had the pleasure of a trip to the Flinders Ranges, Lake Eyre and Birdsville in July and August of this year. We set off happily to enjoy the results of the recent rains little thinking that it would rain again and again on our trip and we wouldn't be able to do everything we wanted due to road closures. For example, rain across inland Australia when we were at Wilcannia meant that we couldn't get up through north western NSW into Queensland. So we changed the direction of the trip and travelled on the bitumen to the Flinders Ranges in South Australia at the beginning of the trip rather than the end.

The Flinders Ranges gave us our second dose of rain and cold. We decided that this was the time we would climb St Mary Peak (1171m – higher than Blackheath and Mt Victoria in the Blue Mountains). It was the closest I have ever been to hypothermia; on our pocket weather meter it was 4.5° C and minus 2.5° C wind chill on the peak. Rain was visible to the south and we rushed down from the peak before the cold and rain combined but fortunately we were safely tucked away in the restaurant before it finally swept over us.

By the time we arrived at Marree to start the Birdsville Track the track was open again but still muddy in parts with some creeks and rivers still running. No real adventures on the track but the afternoon we came into Birdsville we had magnificent views of storm clouds to the north. Again we were lucky; the thunderstorm didn't break over us til 2 o'clock in the morning when we were safely camped at Birdsville. We potted around for a day and woke next morning to a thick fog, one that didn't lift until 11

o'clock. What a site over the arid inland! We had more storms and rain as we travelled east from Birdsville; we certainly learnt the importance of a thin strip of bitumen, a vital lifeline.



Figure 1. Mist over 'Big Red', the biggest sand hill near Birdsville. The last time I saw this area was 1994 and in the middle of a drought. The 'lake' in the foreground certainly didn't exist back then.



Figure 2. Plants from the families Bassicaceae and Asteraceae successfully flowering after the introduction of calicivirus to control rabbits, and rain.

The inland looked fantastic. There was green and flowers on the gibber plains, and on the sand dunes; chevrons of pelicans and spirals of ibis over them.

We saw many birds I have never seen before; Orange and Crimson Chats, Gibber Chat, Australian Pratincole, and most excitingly a large flock of Flock Bronzewing pigeons.



Figure 3. A Crimson Chat posing next to a goodenia.

The most disappointing feature was the behaviour of many tourists; I had the feeling the outback was perceived as a giant adventure park that tourists could exploit as they wished. One of the worst examples was the collection of firewood for huge fires – in one case still stacked waist high and burning when the group went to bed and even left burning when they departed next morning. No one seemed to realise that wood is only produced along inland creeks in good seasons, perhaps decades apart. Cooper Creek flooded to Lake Eyre in 1974 and then in 1990-91, therefore wood was probably last produced in any quantity 20 years ago. Chainsaws were used to cut off huge dead and hollow branches even as budgerigars, corellas and many other birds were searching for hollows. Dead branches also act as good perching sites for many birds. These were also disappearing under the saw.



Figure 4. Dead and scraggy acacias may make good firewood but more importantly they are vital nesting sites.

National Park policies prohibiting collection of firewood may work in ‘city’ parks but in inland areas all it means is that paddocks near access roads of nearby properties are stripped of wood. Again and again we read signs erected along the roadsides by property owners that said ‘No firewood collection’ or ‘No chainsaws’. The sign in the facility block at Mungeranie Hotel on the Birdsville track carefully explained to visitors why they should not destroy the very environment they were enjoying:

“No fires allowed, unless you bring your own firewood (Our dead trees, hollow logs and ground litter are home to some very rare native animals, so please do not disturb)”

It seemed to me that tourists, including many ‘green’ city dwellers need to learn some respect for the environments they were visiting. The outback is where property owners try to make a living and our native flora and fauna try to survive. A gas stove and a woolly jumper or two might help preserve the environment for everyone.

Left: Figure 5. Timber on the way to a campfire along the banks of Cooper Creek.

Biodiversity: as big as climate change.

Article by Vjekoslav Matic, a PhD student in the department of civil and environmental engineering at the University of Melbourne. He wrote in Crikey on 18 October:

"Everybody has heard about climate change, but how many people have heard about biodiversity, or know exactly what biodiversity is? What about the important UN conference on biodiversity that starts today in Nagoya, Japan?"

According to a recent poll by the UK's Natural History Museum only 12% of those surveyed know what the UN Convention on Biological Diversity's (CBD) 10th Conference of the Parties (COP 10) is about, which shows an alarmingly small amount of public awareness.

The conference, which is being held in Nagoya, Japan, from today until October 29, will be attended by representatives from 193 nations. The conference represents, for international efforts to set and reach targets to safeguard biodiversity, what Kyoto was for climate change back in 1998. The issue of biodiversity is, however, arguably as important as climate change, with a similar degree of urgency.

"For the future generations to inherit the benefits of nature, it is imperative that we specifically indicate collective actions over the next 10 years," said Japanese foreign minister Seiji Maehara when he travelled to New York to present a resolution for adoption ahead of the conference. At the same high-level meeting, UN secretary general Ban Ki Moon compared the issue of biodiversity conservation to the global financial crisis, saying "the biodiversity crisis is no different. We are bankrupting our natural economy. We need to fashion a rescue package before it is too late".

Previous targets for "significant reduction in the current rate of biodiversity loss" were not met, and in debates in the European parliament ahead of the conference have

voiced "deep concern" that not enough is being done.

It is interesting then, that while climate change was a pivotal issue in our last election here in Australia that the issue of biodiversity appears to be so under represented by media and in politics. What does it say when the Australian environmental minister, Tony Burke, is not planning to attend? Why is biodiversity so under represented in politics, the media, and in our own minds? While it is great that global warming has received the media attention it deserves and raised public awareness, why has this not spilled over to other environmental causes that are just as urgent and important?

I had a chat with ecological geneticist Professor Ari Hoffman, from the Centre of Environmental Stress and Adaptation research at the University of Melbourne, about the possible reasons why this might be the case. He suggests that one reason may be that what needs to be done for biodiversity is not as straightforward as climate change. In the case of climate change we need to reduce the amounts of carbon in the atmosphere below a particular threshold, but what are the important processes threatening biodiversity?

Professor Hoffmann explains that it will only be possible to slow down biodiversity loss through reduced expansion of agricultural land, controlling invasive species, and mitigating climate change. The complexity in understanding the crucial "tipping points" for ecosystems arise when we consider species adaptation abilities. These include changes in behaviour, plasticity and evolution. Using these adaptation methods, species and consequently ecosystems, have been able to previously survive the threats of species invasion or land clearing."

STEP Committee 2011

Barry Tomkinson – President/editor
Stephen Procter – Treasurer
John Martyn;
Don Davidson;
Andrew Little;

John Burke – Vice President;
Helen Wortham – Secretary;
Tim Gastineau-Hills;
Robin Buchanan;
Jill Green

Colour banding in Sydney sandstone

Article by Ron Vernon, Emeritus Professor of Geology at Macquarie University. Ron Vernon is the author of the popular-level book "Beneath Our Feet" as well as many technical papers and books.

A feature that many walkers will have noticed is spectacular brown to orange, 'rusty' colour banding in the sandstone (Hawkesbury Sandstone) that characterizes coastal, harbour and valley cliffs and platforms in the Sydney region and Blue Mountains. The banding cuts across primary sedimentary structures. It is most clearly seen in sawn slabs used for building facings, steps, walls and other architectural features, but can also be seen in outcrops.

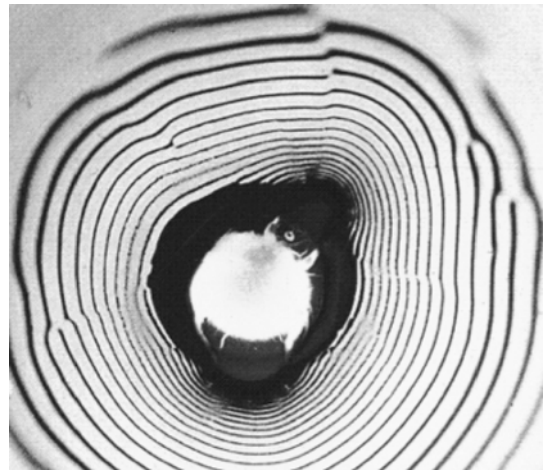
In earlier times, architects tended to select the most uniform sandstone available, as seen in our older buildings in the city, but more recently sandstone with colour banding seems to have become more popular (Figure 1) Figure. 1. Colour banding in sawn sandstone.



Colour banding in sandstone occurs at many places, world wide (notably in the historic site, Petra, in Jordan), but nobody seems to have investigated its origin in detail. In a general way, the banding resembles the spectacular rings produced when a drop of silver nitrate is added to a layer of gelatin impregnated with potassium dichromate (Fig. 2). A chemical reaction occurs, resulting in concentric rings of silver dichromate, called Liesegang rings, named after an eccentric German chemist and photographer, Raphael Liesegang, who first tried this experiment.

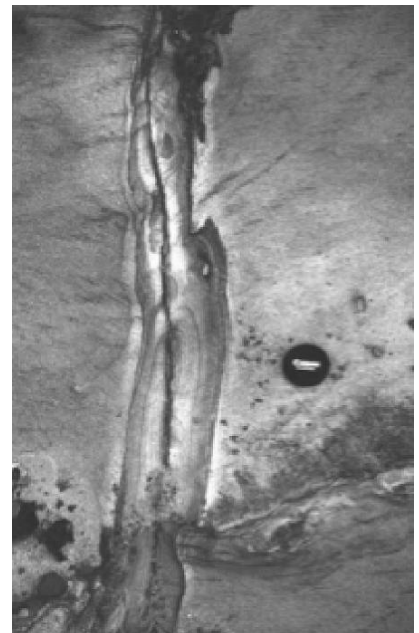
The reason for the periodic deposition of the rings is a subject of some debate.

Figure 2. Liesegang rings of silver dichromate formed in the laboratory



A really good place to examine colour banding in sandstone is in Bouddi National Park, immediately east of Killcare. Stroll along the track and boardwalk and you will come across extensive rock exposures showing wonderful banded structures. You will notice that the brown colouring is commonly related to cracks in the rocks, as shown in Fig. 3. This is because it is the result of downward percolation of rainwater. Over a long period of time, the acidic water dissolves iron carbonate ('siderite') from between the quartz sand grains that make up the sandstone. The iron forms less soluble hydrated iron oxide ('limonite') that is deposited as a brown rusty-looking stain. The carbonate component is washed away.

Figure 3. Concentration of hydrated iron oxide ('limonite') along a crack



(joint) in sandstone

Rainwater has spread out into the sandstone from the crack, producing colour banding. You can also see that the banded patterns are controlled by the arrangements of the cracks or 'joints' (Figure 4), though very irregular patterns are also present (Figure 5.)

Figure 4. Rectilinear joints in sandstone controlling the distribution of colour banding, Bouddi National Park, east of Killcare



Rainwater penetrates along the joints and then spreads out by percolating slowly through the sandstone between the joints, precipitating 'limonite' periodically to produce the beautiful curved ring structures. We know that water can penetrate sandstone, because early settlers used to pour water onto a slab of sandstone and collect the water that came out the bottom; it was a way of cooling their drinking water.

Figure 5. Complicated, intersecting ring patterns caused by changes in the flow patterns of rainwater



Though we cannot be sure that the rings are exactly the same as Liesegang rings produced in the laboratory, many people believe they are formed in a generally similar way. Whatever their origin, the banding patterns at Killcare are

very spectacular and worth a visit. Please remember they are in a national park, and do take care not to damage the outcrops in any way. This is a geologically important locality that should be preserved for future generations

Authors note: More interesting information about Liesegang rings can be found at: <http://www.insilico.hu/liesegang/history/history.html>

Getting algae to clean up

Article written by STEP Vice President John Burke.

A major problem for the management of bushland in low nutrient soils such as Hawkesbury Sandstone is the ingress of nutrients, especially phosphorus, from urban stormwater. This is why weeds proliferate along our water courses and below stormwater outlets and behind houses. These nutrients come from detergents, dogs and cats, garden and lawn fertilisers and similar sources. Bushland managers fool themselves into believing that bioretention swales and the like remove the nutrients but they offer not a skerrick of scientific evidence to back up their claims. The nutrients all end up degrading bushland.

One option in some circumstances is to pipe stormwater directly to creeks and rivers. However that adds the nutrients to the streams and further degrades them. So we are left with the choice of degrading bushland or waterways. Not really an appealing choice.

An article in Crikey.com on 27 September 2010 quotes an article from Giles Parkinson of *Climate Speculator* that can be found at the internet address below. He says that billions of dollars are being invested into algae harvesting. One section of the article says,

'One of the oldest and simplest organisms is now the focus of billions of dollars of

investment in research and development, commercialisation and business plans. And if its promoters are right, there's not much it can't do: It captures greenhouse emissions from power plants, creates biofuels for transport, jet fuel for planes, feedstock for animals, protein for humans and animals, acts as a fertiliser, a key bonding agent for plastics, and a key ingredient for cosmetics and foodstuffs. And it can clean up water ways and sewage ponds as well. In short, it seems it can power us, feed us, pamper us, and then clean up the mess we leave behind.'

Now we are deluged with cures for cancer and other marvellous things that mostly seem never to come to pass. Science does have many successes, however, and the chance here is that the technology to clean up nutrients will come as a spin-off from the need to develop alternative fuels. And billions of dollars going into research means that they are dead serious. We can only wait in hope.

The article *Super fuel or super hype?* can be found at <http://www.climatespectator.com.au/commentary/algae%20fuel-biofuels-MBD-Energy-Algae-Tec-Aquaflo-Bionomic-feedstock-plastics>

STEP Walks Programme

Sunday 14 November 2010. STEP Walk: Lane Cove River Loop.

John Martyn will lead the final STEP walk for 2010. This walk follows both sides of the Lane Cove River between the weir and De Burghs Bridge. The river defines a shallow gorge sweeping around several great incised meanders, and undercutting river cliffs on the outsides of the bends. Pockets of coachwood forest nestle in rocky glades. River flats support tall eucalypt forest or have been cleared to grassy picnic areas. Drier woodland

features wildflowers, and there are striking massed displays of pink-flowering trigger plants (*Stylidium*) in November. As always near water there is plenty of animal life. This is unpredictable of course, but water birds are always present, as often are eastern water dragons. Colourful dragonflies and damselflies hover and dart, and shoals of fish can usually be seen, especially in and around the weir and artificial fishway.

Meet: At the Lane Cove weir (main entrance) at 9.45am.

Start time: 10.00 am (prompt start.)

Walk length: 10 km,

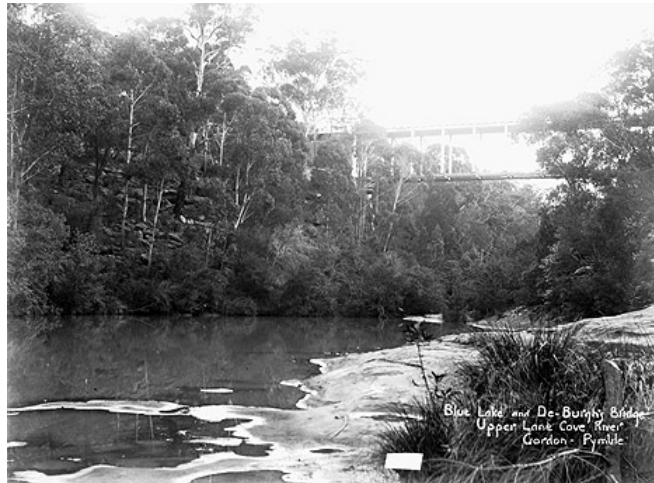
Difficulty/grade: moderate

Estimated duration: 4 hours including lunch stop. (Your \$7.00 parking fee will contribute towards maintenance of our beautiful national parks.)

Bring: Camera and binoculars and a light lunch, plus water. Usual STEP tea and bikkies at the end for survivors. Early arrivals: check out the bird and fish life while you wait.

Contact: John Martyn if you are coming on the walk. Tel: 9449 7962. Mob: 0425 830 260.

Email: johnmartyn@optusnet.com.au



Above: Early photograph of Lane Cove River

Walks Programme 2011

STEP has established a programme of walks for the first half of 2011. Full details will be

available on our new website. Check it out! (www.step.org.au)

STEP Committee member John Martyn comments on local and international phenomena, both man made and natural:

- Trails and slashed verges

In Ku-ring-gai Chase this year, they have somewhat brutally slashed the verges of the Salvation Loop and its extensions: necessary for fire management perhaps; but at the peak of the wildflower season??? Nearer to home territory last year, the same treatment was dealt to the Fox Valley ridge top firetrail. It takes a while for the vegetation to recover, and it never quite re-adopts the character of the adjacent bushland. But there can be some interesting surprises in the regrowth.

If you have walked the heathland firetrails of the Royal and Ku-ring-gai Chase this year you have had a real treat. The wildflowers have been spectacular. In heathland there are relatively few little narrow intimate tracks, and mostly you will walk along wide trails with slashed verges, turning bays and helicopter pads. Not ideal for native flora, or so you would think, but I was with a party of botanists on the Uloomooloo Track in the Royal once, and we (mostly they) found about 15 native plant species in the bristly, mown area of a helipad; and there were no weeds.

This year Isolde and I walked the Mt Bass Firetrail off the Bundeena Road (the best place to see massed flowering of pink swamp heath, *Sprengelia incarnata*). The track verges were sprinkled with bright-purple five-rayed stars of the small waxlip orchid *Glossodia minor*. But what really stopped us in our tracks were patches of the tiny flowers of *Viola sieberiana*. This diminutive but beautiful violet is all-over bluish mauve and resembles a European wild violet, lacking the colour variegation of the common *V. hederacea* and *V. banksii*. It would be almost impossible to locate it in the dense heath vegetation bordering the mown area, and I suspect, like the waxlip orchid, it has a preference for the sunlit verges. Another plant I have never seen except on mown verges is *Bauera microphylla*, the uncommon, miniature, white-flowered cousin of pink-flowered *Bauera rubioides* that we call dog rose.

In Ku-ring-gai Chase, your best chance of seeing the beautiful, September-flowering dotted sun orchid (*Thelymitra ixioides*) is along mown verges, though they also pop up in adjoining bushland. Equally beautiful are the flowers of black-eyed susans (*Tetralix* spp.) which on the verges adopt a compact, ground-hugging habit and are packed with deep-pink flowers in

contrast to their more straggly, less floriferous habit in the bordering bushland.

We probably have to live with fire management, cleared verges, helipads and turning areas. The clearing width often seems excessive and brutal, but there are some positive outcomes for some species. When you walk kilometre after kilometre of West Head ridgetop firetrail bordered by dark, impenetrable sheoak and banksia thicket, the mown verges are usually the only places you will see low-growing wildflowers such as orchids.

- Weather extremes and jet streams.

Considering how much Australians understand and empathise with bushfire and its victims, the poor level of coverage of the recent Russian wildfires in our popular press was a great disappointment; largely displaced by excessive election coverage it seems. The fires were almost unprecedented, and it was easy to jump to the conclusion that climate change was a prime cause. From all that I have read however it seems that the jury is out on this one, but an explanation certainly *has* been put forward, and featured in New Scientist and science articles in the popular press. It is intricately interwoven with the Pakistan floods, and it lies in the stalling and stagnation of great loops or meanders in the jet stream.

Jet streams that may reach speeds in excess of 300 km/h in the upper troposphere, blow at altitudes from 7,000 to 13,000m, and encircle both hemispheres. In Australia we are subject to two: the subtropical jet stream that flows across the continent especially in winter, generally between 20° and 35° latitude, and the more discontinuous polar front jet stream that commonly overtops southern cold fronts. You will often see jet stream cloud over Sydney in winter: cirrus clouds, sometimes in bizarre or beautiful shapes, that move rapidly eastwards or south-eastwards across the sky.

Jet streams do not blow in a straight line but have curvilinear paths and can form great loops or meanders. Normally the loops migrate gradually eastwards, but on occasion this migration stalls or stagnates. This is what happened in the Northern Hemisphere this past year. In summer a big double loop in the polar jet stream stalled over Eurasia. The northward meander constrained and stagnated a mass of hot, dry air over Russia, while to the east of it a

southward-plunging loop stalled and constrained a mass of cold air over the Himalayas. The blocked hot air mass fed the fires and held on to the polluting smoke, while the cold air triggered excessive and persistent rainfall in the seasonal monsoon over northern Pakistan. And the previous icy winter in Europe was also related to a blocked jet stream configuration; this time over the Atlantic.

As mentioned earlier, a link to climate change is unclear, but blocking events, and frigid European winters, have been shown from past records be more likely to occur in periods of

lower sunspot activity like at present. Despite this solar cooling trend, the planet still appears to be warming overall and this would arguably favour more intense fires as well as more extreme rainfall events when blocking patterns do occur.

If you happen to be a weather geek like me, you will probably be aware that you can find Australia's latest jet stream configuration at www.weatherzone.com.au/synoptic. Otherwise your only experience of jet streams may be when you fly to Perth into a strong one, and the flight takes five hours instead of four.

How many species are there on Earth?

Article written by STEP Committee member Jill Green, who adds "further to my article in the August 2010 edition of STEP Matters, this article gives a brief overview of some attempts that have been made to measure biodiversity and the level of losses of species that is occurring."

Before considering the significance of species extinction rates one needs to know how many species there are. Estimates of the number of species on Earth range from 2 to 50 million with the greatest concentration of diversity in tropical rainforests. This is a big range in numbers and demonstrates the uncertainty of the whole issue.

One often quoted study was made by Terry Erwin in 1991. He fogged with insecticide 19 trees of the same species in a tropical forest and counted the number of species of dead beetles that dropped out of the canopy. The process was repeated at different times of the year. He identified 955+ species of beetles. From this hard data the extrapolation began, taking into account information like the number of species of trees in the forest, the proportion of host specific (living only on one type of tree) as against transient species and the number of

species on the ground compared to the number in the canopy. Experts estimate that beetles make up 40% of all insect species. Erwin finally came up with a total of 30 million species of insects worldwide.

With these surveys, the more you look, the more you find. Initially when a new area is researched, the new discovery rate is very high. A large number of surveys is required until curve of total species discovered over time starts to flatten out, that is, the number of new finds is reduced significantly.

Robert M May came up with another method. He made estimates of between 10 and 50 million assuming a simple inverse relationship between body size and the number of animal species (see the graph below).

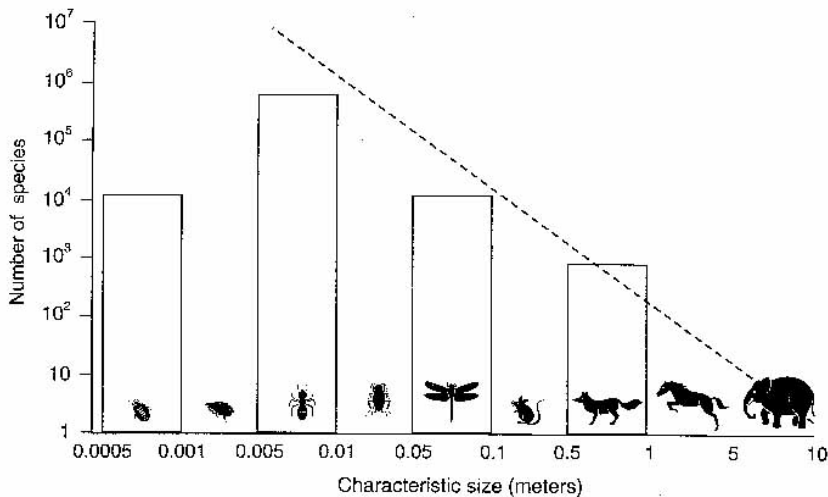


FIGURE 5-6 Using the relationship between the number of species and their body size for larger organisms, it is possible to back-predict for the less well-known smaller species to estimate the total number of species in the world (after May 1978, 1988).

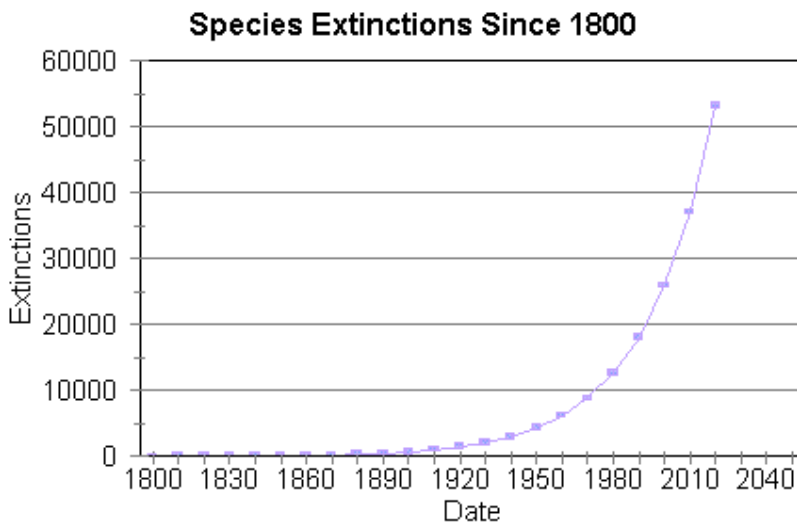
While by far the greatest number of species is found in the invertebrate world, the loss of species that comes to the attention of the general public is the larger animals and birds, in particular the cute and cuddly ones.

What is a significant extinction event?

The fossil and geological records indicate that the Earth has undergone 5 mass extinction events in its history. These were mostly caused by volcanic eruptions that led to major climatic changes and resulted in the reduction of more than 50% of species existing at the time. These extinctions, in fact, laid the groundwork for major progressions in evolution such as the rise of

mammals. Overall, some 90% of species which have ever existed are now extinct – but only palaeontologists, geologists think about things over such long time horizons.

Apart from mass extinction events there is a normal natural selection type extinction rate or a background extinction rate. However this is dwarfed by the estimates of the current loss of species through human activity of 1,000 to 10,000 times the background rate. The rate has been accelerating over the last half century as illustrated by the graph below. It has been predicted that 20% to 50% of total species could be lost over the next century.



Source: <http://www.whole-systems.org/extinctions.html>

More specific attempts to evaluate the threat to global biodiversity are made by the World Conservation Union in their publication of the threatened species "Red List". The table below

summarises the latest evaluation made in 2008 (Source: <http://www.iucnredlist.org/about/summary-statistics>)

Class	Estimated Number of described species	Number of species evaluated by 2008	Number of threatened species in 2008	Number threatened, as % of species described	Number threatened, as % of species evaluated
Mammals	5,488	5,488	1,141	21%	21%
Birds	9,990	9,990	1,222	12%	12%
Reptiles	8,734	1,385	423	5%	31%
Amphibians	6,347	6,260	1,905	30%	30%
Fishes	30,700	3,481	1,275	4%	37%
Invertebrates	1,232,384	6,161	2,496	0.20%	41%
Plants	298,506	12,055	8,457	3%	70%
Others	50,040	18	9	0.02%	50%

As pointed out in the IUCN website, "apart from the mammals, birds, amphibians and gymnosperms (i.e. those groups completely or almost completely evaluated), the figures in the last column are gross over-estimates of the percentage threatened due to biases in the assessment process towards assessing species that are thought to be threatened, species for which data are readily available, and under-reporting of Least Concern species. The true value for the percentage threatened lies somewhere in the range indicated by the two

right-hand columns. In most cases this represents a very broad range. For example, the true percentage of threatened insects' lies somewhere between 0.07% and 50%."

Clearly the assessment of the significance of loss of biodiversity in a particular area of land should take into account as many sources of data as possible. Future development needs to allow for a precautionary approach to loss of ecosystems given the uncertainties in the understanding of potential consequences.

Source: <http://faculty.plattsburgh.edu/thomas.wolosz/howmanysp.htm>

News Flash: WWF welcomes ban of toxic pesticide endosulfan

The World Wildlife Fund Australia issued the following email on 18 October:

"WWF today commended the decision by the Australian Pesticides and Veterinary Medicines Authority (APVMA) to finally end use of the toxic insecticide endosulfan in Australia. Yesterday's decision was based on endosulfan's harmful environmental effects and means the chemical will be immediately deregistered and existing stocks phased out of use on Australian horticulture, cotton and macadamia nut crops within two years.

"Australia is finally catching up with more than 60 other countries that have already decided to ban this toxic chemical, namely the United States, Canada, New Zealand and Europe," said WWF-Australia spokesperson Juliette King. "It seems Australia's pesticide regulator was starting to feel the heat defending a chemical known to be dangerous, especially to the health of farmers."

WWF is critical of the APVMA for not acknowledging the human health risks of endosulfan, particularly as a loophole allows use of existing stock for up to two years. The US Environment Protection Agency recently concluded that endosulfan can cause neurological damage and reproductive complications in farm workers.

"Endosulfan is a very nasty poison, but there are many other dangerous pesticides still posing unacceptable risks to Australian farmers and wildlife," Ms King said. "We need better processes to ensure the faster removal of pesticides when they are known to be dangerous."

The APVMA has been reviewing the safety of at least eight dangerous chemicals for more than 13 years, although they remain on shelves in the meantime. The insecticide fenitrothion, one of the chemicals to be sprayed over large parts of the country to control an impending locust plague, has been under review by the APVMA since 1996 because of concerns about its human health effects.


Following the APVMA's announcement, WWF today called on new Environment Minister Tony Burke to accelerate deregistration of clearly dangerous chemicals, as promised in his previous role as Agricultural Minister.

"We remind the Labor Party of their pre-election commitment to reform Australia's pesticides laws to deliver systemic and widespread reform, as opposed to one offs like this," said Ms King. "The promised reform will better protect humans and the environment from the impacts of pesticides by putting the onus back on chemical companies to prove their products remain safe."

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