Geoscience Pathways Project Newsletter

(January - 26)

We are a 'not-for-profit' incorporated body of like-minded teachers, academics and geoscientists. We work together to support the teaching and learning of Earth in Space (R-10) under the Australian Science Curriculum and senior secondary (SACE) Earth and Environmental Science (EES). Thanks to the generosity of our sponsors we continue to offer unique and timely support as described on these pages.

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Student Prizes for Earth System Studies

From 2021 the Geoscience Pathways Project will offer $2500 in annual prize money for the best Earth Systems Studies (ESS) submitted for external assessment of SACE Stage 2 Earth and Environmental Science (EES). These prizes have been funded through the generous support of our sponsor, the SA Division of the Geological Society of Australia (GSA)

Entries will be judged on the basis of short video presentations that document student work. Submitted videos must be no more than 2-minutes in length and should demonstrate how studies:

- meet the general requirements as outlined in the SACE Curriculum,
- have benefited a local community or been helpful towards addressing a local environmental issue, and
- demonstrate sound scientific methodologies and research skills

For information contact the Geoscience Pathways Project:

Kelly Sharrad
Chairperson
ksharrad@gmail.com

Amanda Vernik
Webmaster
geoscience.pathways@gmail.com

2021 SASTA Annual Conference

To be presented at Pulteney Grammar School by Dr Cesca McInerny & Kelly Sharrad on behalf of the Geoscience Pathways Project

Monday 12 April 2021 - Session 1 11.10am - 12.10pm

Opportunities for student participation in real scientific investigations through SACE Earth and Environmental Science

Course writers required - a call for expressions of interest

The Geoscience Pathways Project is looking for one or two appropriately qualified writers to draft a 'Rocks and Minerals' unit, for students (and teachers) of Year 8 Science. The Unit must address all of the requirements of the Australian Science Curriculum for Year 8. Payment for this work will be negotiated on the basis that approximately 10 – 15 hours might be needed to research and write an appropriate 5-week unit. Expressions of interest should be no more than one page and should outline relevant qualifications, experience and enthusiasm to take on this important task. Expression of Interests should be directed to the Chairperson, Geoscience Pathways Project, by email (ksharrad@gmail.com) and received no later than 5:00 pm on Monday 8th February

The Copper Story: with virtual visits to Year 8 Science classrooms

BHP geologists at Olympic Dam have prepared a U-tube presentation about Copper for our project. They have also offered a virtual classroom visit (zoom), by teacher invitation, to enable students to 'meet', interact and ask questions of the presenters. The production of this resource was fully funded by BHP. It has specifically targeted Year 8 Science students but may also be useful at other year levels, including the Year 12 EES 'Earth's Resources' topic. The 'virtual classroom visits' by geologists will provide teachers a unique opportunity to address the 'Science as a Human Endeavour' requirements of both the Australian Science Curriculum and the SACE.

Check out the Copper Story Video: https://youtu.be/5OJLIz-0ASs

Introducing the GPP's new Chairperson

Kelly Sharrad is the chairperson of our Geoscience Pathways Project (GPP). She currently teaches Stage 1 and 2 Earth and Environmental Science. Kelly is passionate about furthering understanding and action related to Climate Change and Sustainability in schools. Kelly was a co-writer of the SACE EES Curriculum and has subsequently worked as a marker and subject moderator. She feels it is important to support the teaching of EES and currently mentors several Stage 2 EES teachers. In addition to her role as chairperson of the GPP Committee Kelly works with as a teacher mentor and resource writer for the Earth and Space strand of the R-10 Australian Science Curriculum.

Citizen Science through SACE Stage 2 EES

By Kelly Sharrad

Stage 2 Earth and Environmental Science (EES) offers a 30% externally assessed Earth Systems Study (ESS) in comparison to the traditional exam of other Stage 2 Science subjects. This study provides an opportunity for students to investigate a local issue or phenomena of interest and to collect data over a significant amount of time. This opportunity is more likely found in the honours project of a tertiary course (for example, the honours project I completed in my Bachelor of Science). Rarely do high school students get to investigate an area of science that is a true unknown. In 2018, I had the pleasure of teaching Stage 2 EES at Marden Senior College and the project that students investigated for their external study was the growing conditions of two incredibly rare flowering plants, in collaboration with the SEEDs project run by the Botanic Gardens. Students established their own seed orchard in a raised garden bed. They collected weekly data on the growth of their plants in relation to environmental factors (e.g. rainfall, soil moisture, soil pH and plant proximity) for 3 consecutive school terms. The conclusions this extensive data collection allowed students to form will be invaluable when these plant species are eventually propagated into environments in a rehabilitation program run by the Botanic Gardens. Due to the rare nature of these species, scientists know very little about them. Discoveries that these students made have contributed to scientific knowledge, which is an opportunity that high school students really appreciate

Teaching about Climate Change in SACE EES

With increasing awareness of global warming and climate change through worldwide strikes lead by the generation who will feel the brunt of our decisions, now is the time to think about how to educate the younger generations with the knowledge and skills needed to tackle this massive, global issue. Stage 2 EES offers an extensive topic focused on the issue of climate change. Students explore the causes of climate change on both geological and human time scales, the major Earth Systems responsible for our climate and the flow on effect to not only our environment but to humans as well. They learn to understand that nothing happens in their world in isolation and all actions are interconnected to the way our Earth functions. Hope in a bright future is fostered as students investigate alternative energy production and circular use of resources as solutions to climate change through the other topics covered in Stage 2 EES.

GLOBE

https://www.globe.gov/

The Global Learning and Observations to Benefit the Environment Program (GLOBE) is an international science and education program that provides students and the public worldwide with the opportunity to participate in data collection and the scientific process, and contribute meaningfully to our understanding of the Earth system and global environment. Announced by the U.S. Government in 1994, GLOBE launched its worldwide implementation in 1995.

***Vision**: A worldwide community of students, teachers, scientists, and citizens working together to better understand, sustain, and improve Earth's environment at local, regional, and global scales.*

***Mission**: To promote the teaching and learning of science, enhance environmental literacy and stewardship, and promote scientific discovery.*

The on-line training and huge range of teaching and learning resources (K-12) on this website should be of interest to teachers of **SACE Earth and Environmental Science** and others. Teachers who complete GLOBE training and implement GLOBE protocols in their classroom report positive changes in student attitudes towards science and environmental stewardship.

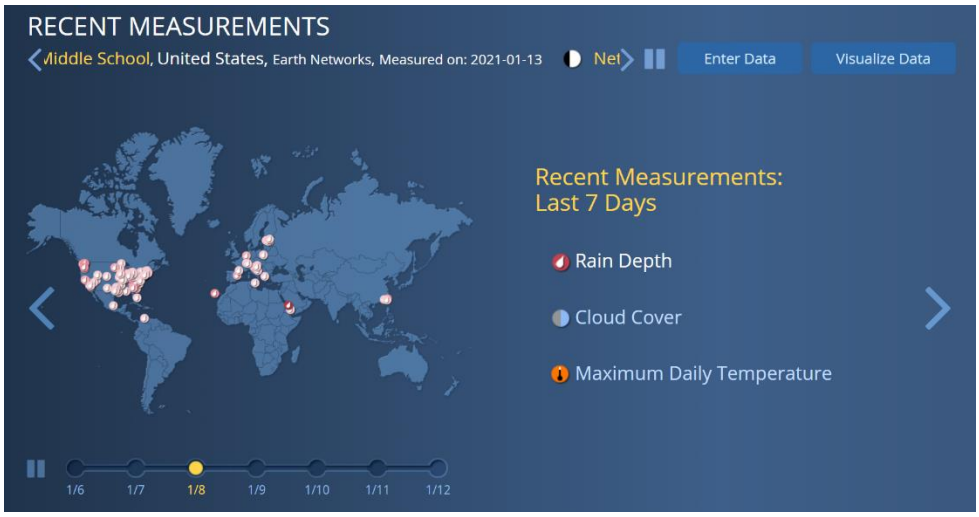
Teachers are invited to create a GLOBE teacher account, which gives you access to register for a Teacher Training Workshop.

Our **Geoscience Pathways Project** is a registered organization with GLOBE, or you can create your own account at your school

Once trained, your GLOBE Teacher account will allow you to report data to the database and post to discussion boards with teachers just like you around the world. Prior to training, you have access to all the resources within the GLOBE website.

Free resources include a Teacher's Guide, tried and tested classroom activities a description of GLOBE's research protocols and Elementary GLOBE, which is a series of age-appropriate storybooks that help young ones understand Earth Science topics.

Students and educators love GLOBE's International Virtual Science Symposium (IVSS) and GLOBE's Student Research Symposia (SRS).



FREE Rock & Mineral hand specimens for schools

Free class sets for up to 20 students, comprising 280 specimens designed to meet the requirements of both Year 8 science and SACE EES. Strictly only one kit can be provided per school, on application. Valued at $500, they will be particularly useful for teachers of the Year 8 Rocks and Minerals topic. Kits will be built according to demand, with priority given to schools:

(1) that are currently teaching EES, or planning to offer it in the future,

(2) that are members of our Geoscience Pathways Project (membership is free)

(3) with teachers planning to attend the following free PD workshops.

FREE PD WORKSHOPS for Primary and Secondary teachers

These workshops will be useful for both Year 8 Science and SACE EES teachers.

Workshop 1: Mineral Identification

On a date to be advised in term 2, at Marden Senior College 1- 37 Marden Road, Marden SA

In this half-day workshop teachers will be guided in the pedagogy, knowledge and skills required to teach identification of minerals as outlined in SACE EES curriculum outline. Teachers will be given resources (PowerPoints) that describe the main mineral identification techniques that can be used in their classrooms to support students in the process. This will be a hands-on workshop with a quick introduction from Kelly. A majority of the workshop will be spent with teachers learning how to identify minerals. A light lunch will be provided.

Workshop 2: Rock Classification

On a date to be advised in term 2, at Marden Senior College 1- 37 Marden Road, Marden SA

In this half-day workshop teachers will be guided in the pedagogy, knowledge and skills required to identify rocks as outlined in SACE EES. Teachers will be given resources (PowerPoints) that will outline the main rock identification techniques that can be used in their classrooms to support students in the process. This is a hands-on workshop with a quick introduction from Kelly. A majority of the workshop will be spent with teachers learning how to identify rocks.

Expressions of interest in these workshops and the free rock and mineral class sets should be directed to the Chairperson of the Geoscience Pathways Project: ksharrad@gmail.com

Year 10 unit on Climate Change Resources

This new resource for **Year 10 Science** has been completed and will shortly be uploaded to our website. The unit was developed by our team of five experienced writers, including Bruce Baker, Cesca McInerney, Cynthia Pyle, Bec Vogt and Kelly Sharrad. It was planned to be launched at the 2020 SASTA STEM conference, but unfortunately that conference was cancelled. It will now be officially launched at the EES Implementation Workshop in February. (see below)

2021 EES Implementation Workshop – BOOKINGS OPEN!

This workshop will feature the launch of our Unit on Climate Change for year 10. There will also be a focus on resources and ideas to support the Earth Systems Study for Stage 2 EES.

Friday 26th February
from **12:30 – 4:00 pm**
in the Sprigg Room (Geology building)
at the **University of Adelaide**.

This workshop is free however registration is **required**: https://www.trybooking.com/BOEMT

The Oaklands Wetland Education Centre

This exciting, purpose-built home for the partnership between the City of Marion and Flinders University, provides a place for education, research and studies into wetlands, and showcasing the site's stormwater re-use scheme. These facilities are free to use and a unique experience open to STEM schools who can book the facility for their educational or meeting needs.

The centre provides:

- a classroom for up to 25 students
- a small-scale field station
- air conditioning and heating
- disability access
- kitchen
- toilet.

For Information contact Peter Reeve:
peter.reeve@flinders.edu.au

Equipment Loans

We offer short-term loans of equipment including class sets of sighting compasses, clinometers, GPS units and a 'Quakecaster' (designed by the USGS).

For more information about our teaching resources and services please visit our website:
www.geosciencepathways.org.au

If your school is not already a member you can join our project (free) by contacting our webmaster:
geoscience.pathways@gmail.com

Sponsors and Supported by:

Some Useful Resources – Fossils hire

By Cynthia Pyle

Evolution from Fossils kit

Does your school have all the practical materials needed for Unit 1 of Earth and Environmental Science?

The following statement forms part of the Australian Curriculum document for Stage 1 of the Senior Secondary curriculum, Earth and Environmental Science:

Introduction to Earth Systems — Science Understanding,

Unit 1: Introduction to Earth Systems Learning Outcomes:

Understand the key features of Earth systems, how they are interrelated, and their collective 4.5 billion year history

The diversification and proliferation of living organisms over time (for example, increases in marine animals in the Cambrian), and the catastrophic collapse of ecosystems (for example, the mass extinction event at the end of the Cretaceous) can be inferred from the fossil record

Your school may lack essential items such as Fossils, to meet this requirement of the curriculum statement.

The Nature Education Centre (NEC), in the grounds of Urbrae High School, hires out several kits that can be used for practical investigations related to fossils and evolution. Most of the kits include suggestions for relevant activities.

The above photograph shows an example of the geological history kits you are able to hire.

Details of the kits can be found on NEC's website — nature.sa.edu.au — and the phone number is 8357 3413.

Your school does not have to join NEC for a whole year. You can join for 3 months — enough to hire the kits you need to cover the Earth Systems topic, for $35.

Kits can be hired for between $5.00 and $12.00 per week.

Opportunities for Student Studies in the Coorong in 2021

1. **Carbon Cycling in the Coorong Lagoon**

One possible student project is around local C cycling in the Coorong lagoon and the related CO2 cycle. (e.g. the question if parts of the lagoon act as sink vs. source of CO2), and what impact that has on local carbonate/CaCO3 formation vs. dissolution). Together with a colleague at Waite campus (Prof. Luke Mosley) researchers at the University of Adelaide have been taking pilot measurements with a new portable CO2 analyser, and if this system proves to be robust, it might be an option for a smaller student project.

CONTACT Dr. Juraj Farkas : juraj.farkas@adelaide.edu.au

2. **Identifying salinity and nutrient threats**

Another possible student project is to investigate salinity and nutrient threats to the keystone aquatic plant Ruppia tuberosa. Students could survey salinity and evidence of nutrients (filamentous algae or slime), and relate this data to the number of seeds found in shallow waters. This would require some sieves to find the seeds, but these are large and fairly identifiable (i.e. just about to the naked eye). The students would also need to be able to measure salinity. Most equipment they are likely to have access to wouldn't cover the hyper saline range in the Coorong, but they could dilute the samples (a useful exercise in itself) and then calculate that salinity).

CONTACT John Tibby: john.tibby@adelaide.edu.au

TERN - Australia's Land Ecosystem Observatory

TERN measures key terrestrial ecosystem attributes over time, from continental scale to field sites at hundreds of representative locations. TERN openly provides model-ready data that enables researchers to detect and interpret changes in ecosystems.

TERN ecosystem data for teaching

This useful booklet of ideas for schools was published in May 2020

Download the 'TERN data for students' summary document and data spreadsheet.

TERN has assembled data into an easily downloaded spreadsheet, teachers and students have access to large, authentic, environmentally related data sets—including from more than 700 TERN Ecosystem Surveillance monitoring plots.

The data in the Excel spreadsheet provide quick and easy access, all without requiring complex data processing tools, such as R Studio. An accompanying summary document provides information and explanation to help you get started using the TERN datasets.

You can use this resource to help gain an insight into scientist-collected data, and to analyse and understand Australian 'big data', open-source data, field methods, statistics, and habitat variables. Usefully, the document has a number of ideas and suggestions on how students can utilise the data available.

https://www.tern.org.au/wp-content/uploads/TERN_data_for_students.pdf

Please share your experience with colleagues

If you have particular resources that you have found useful in your teaching of SACE EES topics, or in your teaching any geoscience topic at any year level of the Earth and Space sub-strand of the Australian Science Curriculum (R – 10), please share these resources with other teachers by:

☐ emailing your resources or useful links to: geoscience.pathways@gmail.com and ksharrad@gmail.com

☐ Joining our Project: geoscience.pathways@gmail.com (Joining is free)

☐ subscribing to our newsletter (also free), http://eepurl.com/dexv4X and/or

☐ attending our occasional workshops: www.geosciencepathways.org.au

2021 Committee Members

The following are the members of our current Geoscience Pathways Management Committee who were elected at our AGM in 2020:

Kelly Sharrad (NEW - GPP Coordinator / Teacher-geologist)
Amanda Vernik (GPP Webmaster, GPP Secretary)
Oanh Luong (Marden Senior College, Treasurer)
Len Altman (Geoscience educator, Funding/Sponsorship)
Bec Vogt (Kangaroo Island Community Education)
Carol Aldous (Flinders University Education lecturer)
Alan Collins (University of Adelaide)
Cesca McInerney (University of Adelaide)
Sarah Chinner (BHP)
Cynthia Pyle (Geoscience educator)
Peter Reeve (PhD student, Flinders University)
Carl Spandler (University of Adelaide)
Jan Varga (PhD student, University of SA)
Felicity Coutts (University of Adelaide)

Thank you to our members for their dedication and support to the Geoscience Pathways Project.

Next Meeting

Our next Committee meeting will be a 'virtual' meeting using Zoom on:
Wednesday 10th February at 4:30pm,
Please email geoscience.pathways@gmail.com if you wish to join.