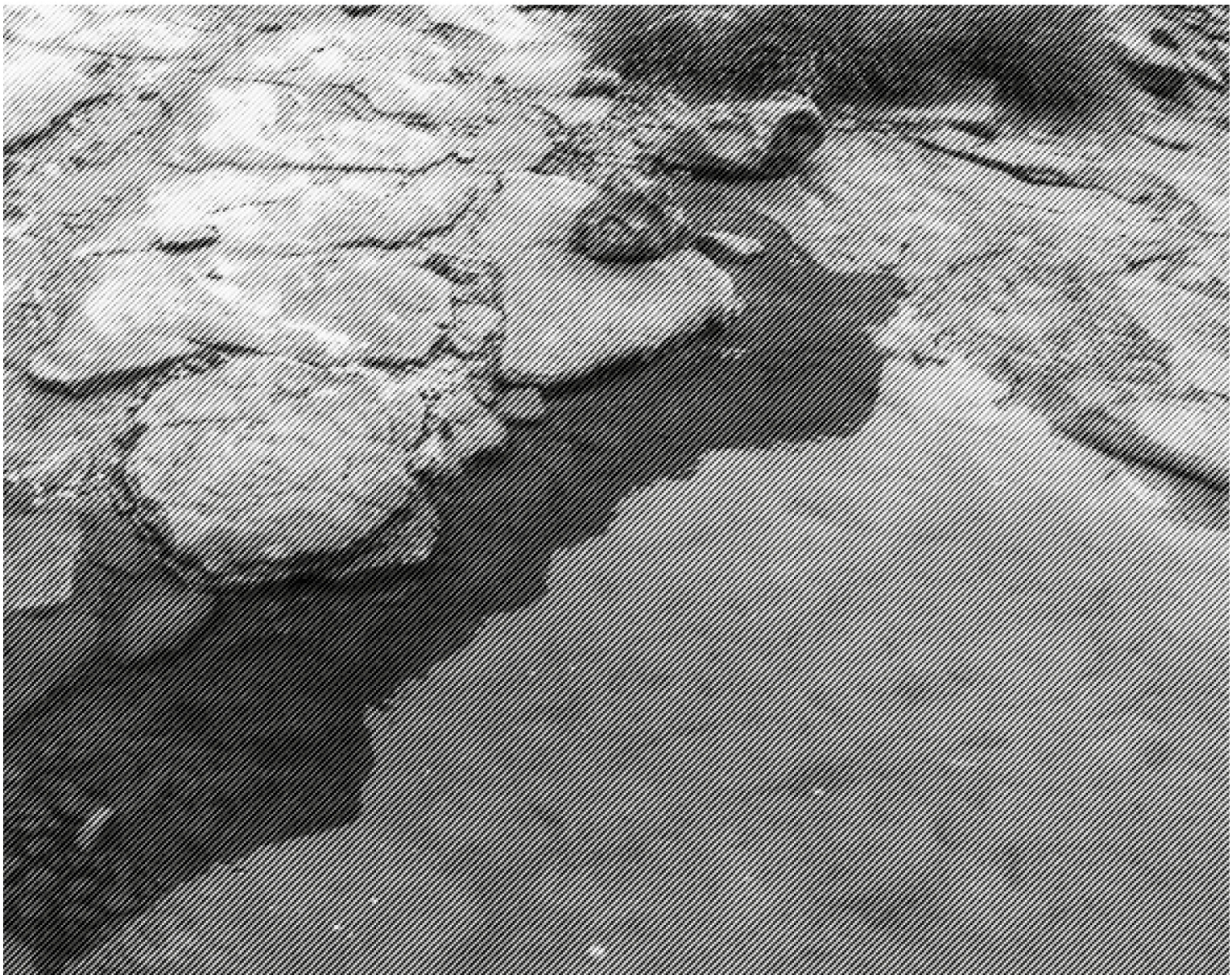
National Centre for Groundwater Research and Training

Resources List

NATIONAL CENTRE FOR
GROUNDWATER RESEARCH AND TRAINING
sustaining a vital water resource



Educational groundwater resources

This document has been prepared by the National Centre for Groundwater Research and Training to provide information on educational resources for school students and teachers.

Useful websites

Wet Rocks

This site provides educational games and resources for students and teachers by state, along with curriculum standards and international resources. The website says:

> Wet Rocks is a valuable resource for both learning and teaching about groundwater. Relevant to the Australian curriculum, Wet Rocks is the study of groundwater and its place in the water cycle, how it is formed, its importance as a resource, and the complexities of groundwater management. It provides interesting, and to many new, perspectives about water in our lives.

http://www.wetrocks.com.au/

United States Geological Survey

The United States Geological Survey (USGS) has a wealth of knowledge on groundwater. It provides helpful images and diagrams to explain items like groundwater storage and groundwater discharge. The following pages in particular may prove useful:

The water cycle:
http://ga.water.usgs.gov/edu/watercycle.html

Groundwater storage:
http://ga.water.usgs.gov/edu/watercyclegwstorage.html

Groundwater discharge:
http://ga.water.usgs.gov/edu/watercyclegwdischarge.html

Water science for schools:
http://ga.water.usgs.gov/edu/

Sitemap of all educational groundwater resources:
http://ga.water.usgs.gov/edu/mearthgw.html

Glossary of water terminology:
http://ga.water.usgs.gov/edu/dictionary.html

SA Water

Although SA Water (the South Australian water utility) does not specifically address groundwater in its educational resources, it does tackle a number of other water relevant topics which could still be of interest for your classroom's study. These include water-wise tips, information about wastewater recycling, and water as a natural resource.

http://www.sawater.com.au/SAWater/Education/

National Ground Water Association

The National Groundwater Association (NGWA) is based in the United States but has partners around the world. Its primary mission is to advance groundwater knowledge and it aims to 'provide guidance to members, government representatives, and the public for sound scientific, economic, and beneficial development, protection, and management of the world's groundwater resources'.

Students could participate in 'Protect Your Groundwater' day during September:
http://www.ngwa.org/Events-Education/groundwater-day/Pages/default.aspx

The Ground Water Adventurers is an NGWA program for kids:
http://www.groundwateradventurers.org/

This section seems most relevant for the high school age group:
http://www.groundwateradventurers.org/braintickle.html#Senior

National Water Commission

The National Water Commission (NWC) is an independent Australian government body responsible for national water reform. Its website provides a short introduction to groundwater, as well as information on Australian groundwater policy.

http://nwc.gov.au/groundwater/more

The very useful NWC *Groundwater Essentials* booklet may be downloaded in PDF format here:

http://www.nwc.gov.au/publications/topic/groundwater/groundwater-essentials

The Groundwater Foundation

The Groundwater Foundation is an American organisation providing community-based programs that involve people in groundwater conservation.

Its site offers some similar activities to those found through the Ground Water Adventurers page, but may contain other useful background information for the students to refer to in preparation of projects.

http://www.groundwater.org/kc/kc.html

http://www.groundwater.org/pe/so_aa.html

World-wide Hydrogeological Mapping and Assessment Programme

The World-wide Hydrogeological Mapping and Assessment Program (WHYMAP) is a joint programme of international organisations such as UNESCO and the International Association of Hydrogeologists.

This site features global water maps, and aims to summarise groundwater information on a global scale.

http://www.whymap.org/whymap/EN/Downloads/Global_maps/globalmaps_node_en.html

Connected Waters Initiative at the University of NSW

The Connected Waters Initiative is affiliated with the National Centre for Groundwater Research and Training, and its website is a fantastic resource for industry leaders, the general public, teachers and students as well.

This site has a plethora of information and resources for the classroom, beginning from this page which links to a number of other learning resources:
https://www.connectedwaters.unsw.edu.au/resources/resources_home.html

Another (possibly more useful) glossary:
https://www.connectedwaters.unsw.edu.au/resources/resources_glossary.html

The Connected Waters list of projects:
https://www.connectedwaters.unsw.edu.au/technical/research/projects/projects_home.html

The Connected Waters Institute maintains an interesting photo gallery:
https://www.connectedwaters.unsw.edu.au/resources/imagegallery.html

United States Environmental Protection Agency

The EPA website has a massive list of resources under their water section, including ideas for incorporating art into water studies.

http://www.epa.gov/students/teachers.html

North American Association for Environmental Education

The North American Association for Environmental Education is a professional association dedicated to advancing environmental education and supporting environmental educators. Its website includes a page of groundwater activities.

http://eelink.net/pages/EE+Activities+-+Groundwater

North Carolina Science Olympiad

This page in itself is not terribly useful, but if you scroll down to the listing of 'Event Resources', there are some really exceptional pages linked for groundwater study, and videos as well.

http://www.sciencenc.com/event-help/awesomeaquifer.php

The South Australian Department for Water

Managed aquifer recharge (or MAR) is a big groundwater topic. This page has a useful explanation of MAR, and the Department for Water website has many other helpful explanations to explore.

http://www.waterforgood.sa.gov.au/stormwater-wastewater/managed-aquifer-recharge/

The National Centre for Groundwater Research and Training

The National Centre for Groundwater Research and Training (NCGRT) was established by the Australian Research Council and the National Water Commission and has partnerships with universities and organisations around the country. Its role is to advance understanding of Australia's groundwater resources and to train the next generation of groundwater researchers.

Currently the NCGRT's website is undergoing a redevelopment, so keep an eye out for changes and improvements throughout the site. In the meantime there is still a lot of useful information available via media releases and research publications; however this site may prove more interesting for older students.

www.groundwater.com.au

Online videos

This ABC news clip introduces the Willunga Super Science Site and features members of the National Centre for Groundwater Research and Training:
http://www.youtube.com/watch?v=yVAKAwqLi0U

A humorous and entertaining, but also very informative, animation video with a song about groundwater and the water cycle:
http://www.youtube.com/watch?v=uQRvN6MUajE
An explanation with great imagery of what it's like to have a career as a hydrogeologist:
http://careercrate.com/video/267/Hydrogeologist

'Scientists investigate the mystery of groundwater' – an ABC news clip featuring NCGRT researchers:
http://www.youtube.com/watch?v=QHeHtcp2we4

A short government video on the Broken Hill managed aquifer recharge project:
http://www.youtube.com/watch?v=3gaDjWUND9Q&feature=relmfu

Using a whimsical model of a tiny staircase, Bill Nye the Science Guy demonstrates the phases of the water cycle:
http://www.youtube.com/watch?v=hehXEYkDq_Y

A water focused episode of the Magic School Bus:
http://www.youtube.com/watch?v=SQ7oqxuZXPU&feature=related

A 30-minute film introducing the Great Artesian Basin:
http://www.youtube.com/watch?v=VB4HFHDdzUc&feature=relmfu

Activity ideas

Make an aquifer model inside of a tank:
http://www.beg.utexas.edu/education/aquitank/tank01.htm

Make an aquifer in a cup – a simple activity that may be better for students working in pairs:
http://www.groundwater.org/kc/activity2.html

Printable 'water jeopardy' questions and answers:
http://cals.arizona.edu/arizonawet/teachersupport/supportmats/water-jeopardy

A more advanced activity regarding bioremediation of nitrate in groundwater:
http://csip.cornell.edu/Curriculum_Resources/CSIP/Sills/Sills_Bioremediation.html

Multiple groundwater activities with worksheets:
http://dnr.wi.gov/org/water/dwg/gw/education/study_guide.htm

Groundwater Essentials booklet

The National Water Commission has produced a really informative booklet called *Groundwater Essentials*. The booklet comes complete with comprehensive diagrams and key points of interest for discussion; it is a useful resource for classrooms studying groundwater and its role in our environments. It has been recommended for the Kids Teaching Kids program.

The following is a snippet from the booklet:

> Groundwater is water located in the saturated zone below earth's surface. Although it is an integral part of the global water cycle, many people imagine groundwater only refers to lakes or rivers in underground caverns. Groundwater is actually surface water that has migrated from the surface, through the ground and become stored in porous rocks.
>
> Typically the water sits in tiny pores, spaces between the smallest soil or rock particles, or narrow cracks in the rock itself. Only in exceptional cases does water get stored in openings that are many metres across. Groundwater comes from two primary sources. When it rains, water infiltrates the soil until it reaches the watertable in an aquifer. Aquifers can also gain water from rivers and streams draining into the ground.

The NCGRT has a number of copies of this booklet which it can make available on request, or it can be downloaded in PDF format from the link in the National Water Commission section above. Or, you can direct enquiries to the National Water Commission itself:

> Communication Director, National Water Commission, 95 Northbourne Avenue, Canberra ACT 2600, Tel: (02) 6102 6000 Email: enquiries@nwc.gov.au

Further information

If you have any questions or comments, please feel free to contact NCGRT communications officer Emily Heylen on (08) 8201 5343 or emily.heylen@groundwater.com.au