

BIOMES (STEM)

An integrated middle school program, using Science, Technology, Engineering and Mathematics to enhance and engage students' learning.



Developed by the Southern Forests SEED Program, 2016



Acknowledgements

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The SEED Program is based within the Shire of Manjimup and aims to raise the profile of careers in agriculture as a valid career pathway by increasing young people's exposure to the field of agriculture, through learning and enabling opportunities to explore the industry and connect with those living and working in agriculture.

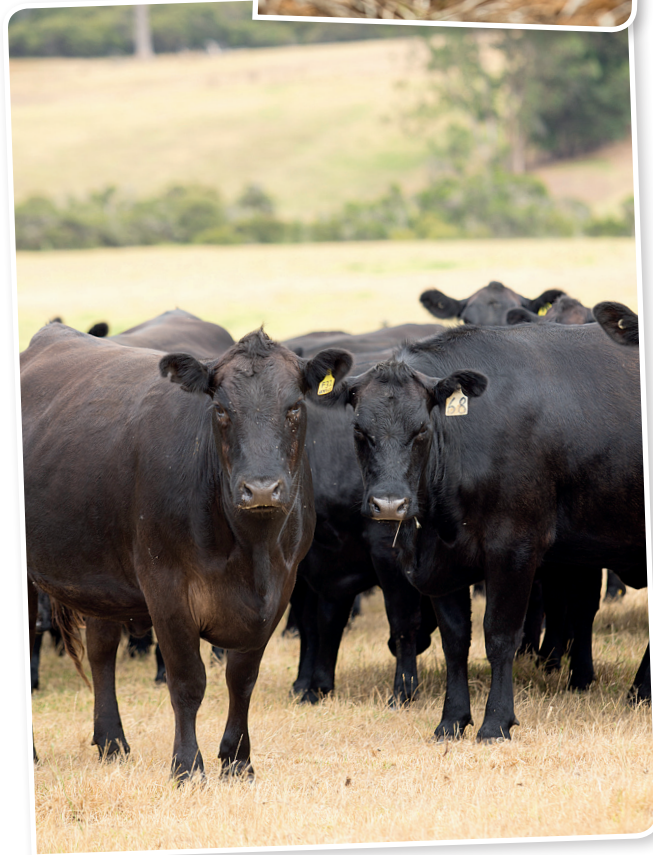
This series of primary and middle school resources allows teachers to use the agricultural industry as a subject area to address cross curricula learning in the classroom. The Southern Forests SEED Program is grateful for the support it has received from the local agriculture industry, linking in with educational programs and hosting excursions to their farms and businesses.

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Photographs in this package are supplied courtesy of Craig Kinder Photography and the Southern Forests Food Council.

Resources contained within this package may be copied and distributed for educational purposes.



Contents

A Note to Teachers	1
Why STEM?	3
Bountiful Biomes	4
The History of STEM in Australia	5
Inking Your Thinking	7
Planning and Production	8
Grassland Biomes #1	9
Aquatic Biomes #2	11
Forest Biomes #3	13
Desert Biomes #4	16
Assessment	19

A Note to Teachers...

HOW TO GET THE MOST OUT OF THIS PROGRAM

Although this page looks long in length it is essential that all teachers read it!

This program works on two main aims; one being **INTEGRATION** and the other being **FLEXIBILITY**.

INTEGRATION relates to many different subject outcomes being achieved through one focus/project. This program works on the idea that through one topic (in this instance Biomes) students can cover outcomes in other subject areas such as; English, Mathematics, Design and Technology and Science. It requires those subject teachers to meet and discuss how they would ensure the "Biome" project could be carried out during their subject time. For example, if you have Year 9s for five periods a week, then perhaps one period could be dedicated to the Biome project as the project has several English outcomes that need to be achieved.

The other aim of the project was to ensure the greatest amount of **FLEXIBILITY** as possible for teachers. The program works on the planning that most of the content regarding biomes would have been delivered prior to introducing any of the projects contained in the package. However, you may have some highly intrinsically motivated and academically able students who would be able to self-direct their own learning quite capably. It requires subject teachers to be very aware of what assistance is required when and to 'trust' students to direct their own learning. **IT DOES NOT MEAN** students are left to their own devices. It means the teachers need to provide a supportive and informative environment (which includes people also!) that will scaffold each student's learning.

It also requires flexibility as different schools will make use of the **different resources** at their disposal. A school that has access to an aquatic environment will investigate the aquatic biome project very differently to a school that is located in an arid, inland area. The same can be said for the varying amount of **background knowledge** that students will bring with them to each project. That is why teachers may need to adapt and vary some of the projects in relation to the context of who they teach and where they teach.

Continued over.

A Note to Teachers...

The projects are **rated** according to the symbol ✨ that is placed near the title. **The more circles there are, the more challenging the project.**

The projects are based on **collaborative group work**. As outlined in the “Why Stem” information page, collaborative learning is now essential for 21st century learning and it should be embraced and utilised as much as possible. How you group your students is your decision. You know your students the best; perhaps grouping according to academic ability will ensure that all students participate to the best of their ability, or you may wish to mix students of varying academic ability so that peer tutoring can occur. The choices are many!

All project tasks are accompanied by the Australian Outcomes in each subject area. As this is an inquiry based program, it is highly likely that students will cover many outcomes that **are not listed** due to the nature of their self-directed learning. However, as a starting point, the set outcomes are listed for each project. Each subject is colour coded and this is used throughout the program – linking with the assessment page.

The planning page is an **essential** component of the program. Students must first plan any ideas to use as the basis of their project (even if it changes several times since the first plan). Students must also be taught how to be reflective and apply critical thinking to their work.

Subject teachers are required to work together to ensure the effectiveness and success of this program.

Initially, it may seem like extra work as it is different to how some subject teachers' work, however, the benefits to the students will soon become apparent as they themselves make the connections and relevance between subject areas.

Why STEM?

EVERY ACTION NEEDS TO BE PROMPTED BY A MOTIVE.

Leonardo da Vinci

The acronym **STEM** stands for Science, Technology, Engineering and Maths and it encompasses all of the knowledge and skills that are found mainly in these subject areas. The wonderful attraction about these skills and knowledge is that they are **HIGHLY transferrable** between careers and these skills are **HIGHLY sought after** by certain careers.

In a society that is moving so rapidly in all areas of the economy, people demonstrating solid STEM skills are the ones that are **going to problem solve, innovate, invent, encompass, devolve, demonstrate, create and provide direction** for the coming years. The skill set and knowledge that STEM provides allows students to comprehend and hypothesize on their own level, to apply new and innovative methods and to believe that the impossible can be made possible.

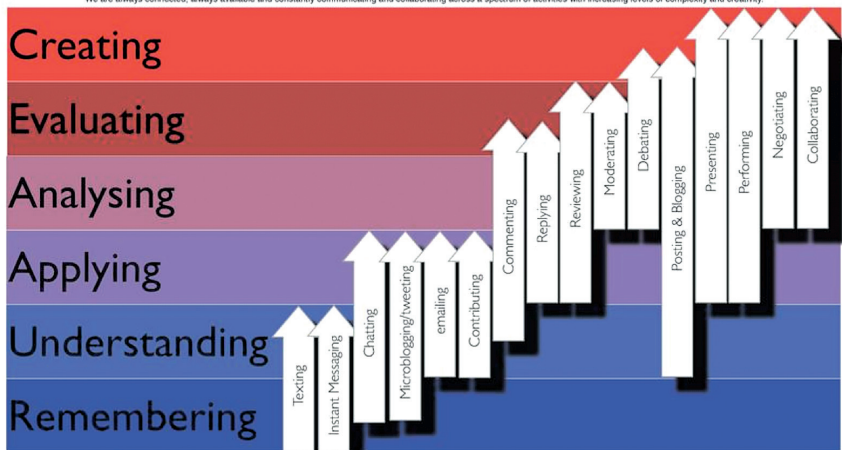
STEM activities and thinking **allow for students to hatch an idea and then see it through to fruition**, using all of their skills and knowledge. STEM allows for students to direct their own learning, basing itself in Inquiry Skills and satisfying natural curiosities that children have about the world around them.

One of the aspects that adds strength to STEM programs is the way it encompasses **Bloom's Revised Taxonomy**. The original Bloom's offers a constant guide and source for programming and planning for all year grades and the Revised Taxonomy, allows for digital technology and the Communication Spectrum to be a focus, which is at the very heart of an effective STEM program.

STEM is **collaborative in nature** and it allows students to explore multiple solutions to a problem. 21st Century dictates that students need to become more collaborative in nature and, combined with Bloom's Revised Taxonomy, they certainly have the ability to be innovative and solution focused.

Bloom's Digital Taxonomy & the Communication Spectrum

In Human history we have seen many different ages: the dark ages, the middle ages and more recently the space and information ages. We live in a time that might best be described as the communication age. We are always connected, always available and constantly communicating and collaborating across a spectrum of activities with increasing levels of complexity and creativity.



Collaboration is not a 21st Century skill, it is a 21st Century essential.

Andrew Churches

Andrew Churches - <http://redungam.wikispaces.com> & <http://globaldigitalcitizen.org>

Bountiful Biomes

Biomes are defined as “a large naturally occurring community of flora and fauna occupying a major habitat, e.g. forest or tundra.” (Oxford Dictionaries 2016) and they are explicitly taught in the Australian Curriculum (V 8.1) in the Year 9 curriculum. Under the Content Descriptors in Geography (Geographical Knowledge and Understanding) Unit 1 focuses on five outcomes that are specific to these various habitats. The Geography subject area bases itself on key inquiry questions which focus on how any variation or change impacts on the world’s environments. The focus on interconnections is paramount to the role that biomes play in the health of the planet.

The following videos are an engaging introduction to the world of biomes and the role that each creature plays in it. The videos are a motivating discussion starter and students could be asked to explain the links between the two videos that, at first, do not seem related to each other.

Digital Resources

www.splash.abc.net.au/home#!/media/526919/food-security-in-australia

Youtube

Introduction to Biomes 3:09
<https://www.youtube.com/watch?v=hly0ZlyPPDg>

Global Food Security 4:27
<https://www.youtube.com/watch?v=8vnYwvYxO6g>

There are many commercial movies that feature different biomes. The following are a few examples where the environment plays a significant role in the story. The students could be asked to name the different biomes that are used as setting in each film.

Avatar	Star Wars	Brother Bear
Finding Nemo	The Lord of the Rings	Ferngully
The Lion King	Mad Max	Dances with Wolves

TEACHER RESOURCE/WEBSITES

For your own background information, the following websites provide a vast range of information, games, quizzes and other resources for you to use in the classroom.

<http://switcheroozoo.com/games/habitatgame.htm>

http://www.gameseducatekids.com/games/build_a_biome

http://www.softschools.com/language_arts/

<http://kids.nceas.ucsb.edu/biomes/>

<https://php.radford.edu/~swoodwar/biomes/>

The History of STEM in Australia ❁

We Australians are a clever bunch, and the world has certainly benefited from ingenious people such as you.

“NECESSITY IS THE MOTHER OF INVENTION”

Proverb; when the need for something becomes essential, you are forced to find ways of getting or achieving it.

Read “Innovation is the Australian way”

<http://australiangeographic.com.au/topics/science-environment>

Discuss how this article supports the above proverb

Choose one of the following Australian inventions and research it to find the answers to the following questions;

Black Box Flight	Google Maps	Winged Keel	Triton work centre
Recorder	Polymer Bank notes	Permaculture	
Spray on Skin	Cochlear implant	Wi-fi technology	
Electronic pacemaker	Electric Drill	Tank bred Tuna	

Who invented it? _____

Where was it invented (not just Australia but more details such as the name of the town/University)

Why was it invented? _____

How was it invented/constructed? _____

Present your findings to your classmates in a visual manner of your choice.

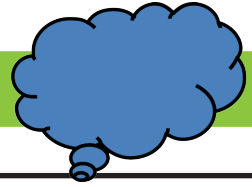
The aim of this lesson is to highlight that Australians are a very clever lot and when something needs doing – we get on and do it!

Australian Curriculum Links

THE HISTORY OF STEM IN AUSTRALIA

Cross-Curricula Priorities		Aboriginal and Torres Strait Islander Histories and Culture	Asia and Australia's Engagement with Asia	Sustainability			
General Capabilities	Literacy	Numeracy	ICT Capability	Critical and Creative Thinking	Ethical behaviour	Personal and Social Capability	Intercultural Understanding
Science Content Strands	Science Understanding		Science Inquiry Skills		Science as a Human Endeavour		
Sub Strands Outcomes					Nature and development of Science ACHSHE158 Use and influence of science ACSHE228		
English Content Strands	Language		Literature		Literacy		
Sub Strands Outcomes					Interacting with Others ACELY1811 ACELY1741 Interpreting, analysing, evaluating ACELY1743 ACELY1744		
Geography Content Strands	Geographical Knowledge and Understanding		Geographical Inquiry and Skills				
Sub Strands Outcomes			Communicating ACHGS070				
Design and Technologies Content Strands	Design and Technology Knowledge and Understanding		Design and Technologies Processes and Production Skills				
Sub Strands Outcomes	Knowledge and Understanding ACTDEK041						

Inking Your Thinking



What is the problem?
What do you need to fix?

Notes:

Questions

How do you think you can fix this? What is the solution going to look like?

What steps are you going to do to fix this problem?

Design

Obstacles?

What materials, resources and people do you need to fix this problem?

How could you improve the solution?

Follow up

Planning and Production



Possible idea	How will it work?	Design	Did it work? Why?
Possible idea	How will it work?	Design	Did it work? Why?
Possible idea	How will it work?	Design	Did it work? Why?
Possible idea	How will it work?	Design	Did it work? Why?
Possible idea	How will it work?	Design	Did it work? Why?
Possible idea	How will it work?	Design	Did it work? Why?

Grassland Biomes #1 ✨

KEY FEATURES

- Grassland biomes are made mostly of grasses.
- Grassland biomes are normally situated between a forest and a desert.
- They are said to be between a forest and a desert when it comes to rainfall. They do not receive enough rainfall to grow trees like a forest but they contain lots of grass so they receive more rain than a desert.
- Tropical grassland biomes are located in the Southern Hemisphere while temperate grassland biomes are located in the Northern Hemisphere.
- Since grassland biomes have rich soil, much of them are used for farming.

ISSUE: THE IMPORTANCE OF GRASSLANDS

SCENARIO: Many grasslands have been lost due to urban sprawl and farming. You have been commissioned by a local conservation organisation to design and build a model of an Australian Grassland to use as a teaching tool at local schools. Your model must look authentic and be accompanied by factual and relevant information. You must submit your drawings (along with measurements and ratio) to your teacher prior to the commencement of any building. You then construct your grassland environment. You must also deliver a PowerPoint or similar presentation detailing the importance of keeping what remaining grasslands Australia still has.

- OBJECTIVE:**
1. Plan, design and create a model of an Australian Grassland environment.
 2. Deliver a presentation outlining the importance of the role of grasslands.

Digital Resources

http://www.blueplanetbiomes.org/savanna_australiacлим_page.htm

<http://www.fog.org.au/grasslands.htm>

http://wwf.panda.org/who_we_are/wwf_offices/australia/environmental_problems_in_australia/

Youtube

Grasslands in Africa and Australia 2:05
<https://www.youtube.com/watch?v=8uXFxPYieRg>

Grassland Ecosystems 3:45
https://www.youtube.com/watch?v=kFIMWyo8P_4

Tropical Grassland Ecosystems 3:14
<https://www.youtube.com/watch?v=AJracGoRUTs>

Australian Curriculum Links

FOR BIOMES #1

Cross-Curricula Priorities		Aboriginal and Torres Strait Islander Histories and Culture	Asia and Australia's Engagement with Asia	Sustainability			
General Capabilities	Literacy	Numeracy	ICT Capability	Critical and Creative Thinking	Ethical behaviour	Personal and Social Capability	Intercultural Understanding
Science Content Strands	Science Understanding		Science Inquiry Skills	Science as a Human Endeavour			
Sub Strands Outcomes	Biological Sciences ACSSU176			Use and influence of science ACSHE228			
Mathematics Content Strands	Number and Algebra		Measurement and Geometry	Statistics and Probability			
Sub Strands Outcomes			Geometric Reasoning ACMMG221				
English Content Strands	Language		Literature	Literacy			
Sub Strands Outcomes	Language for Interaction ACELA1552 Expressing and Developing Ideas ACELA1561			Interacting with Others ACELY1811 ACELY1741 Creating Texts ACELY1746			
Geography Content Strands	Geographical Knowledge and Understanding		Geographical Inquiry and Skills				
Sub Strands Outcomes	Biomes and Food Security ACHGK060 ACHGK063		Communicating ACHGS070				
Design and Technologies Content Strands	Design and Technology Knowledge and Understanding		Design and Technologies Processes and Production Skills				
Sub Strands Outcomes			Processes and Production Skills ACTDEP049 ACTDEP051				

Aquatic Biomes #2 ❁❁

KEY FEATURES

- largest of all the world's biomes
- dominated by water
- life first evolved in the aquatic biome
- three-dimensional environment that exhibits distinct zones of communities
- ocean temperatures and currents play key role in world's climate

ISSUE: BYCATCH

SCENARIO: One of the main issues with fisheries is the burden of fishing activity placed on other animals that are not targeted. Seals are caught in nets trawling for fish, dolphins and Australian sea lions get caught and drown in gillnets fishing for sharks and endangered sharks are caught on longlines fishing for tuna.

The Australian Government has offered to fund a research project that will decrease bycatch by at least 25% in any state or territory, however, they will only fund one project and there will be five other groups competing for this money. You will need to convince the government panel (your teacher) that your idea and prototype are the ones they should invest in. Your group will need to present a five minute presentation describing how your design will be the most worthwhile investing in.

- OBJECTIVE:**
1. Research and deliver a three minute presentation outlining the need for your idea and prototype.
 2. Plan, design and build a net that will allow fishermen to successfully catch fish but allow non-target fish to escape in a pain free and humane way.

Digital Resources

<http://marinewaters.fish.wa.gov.au>

www.amc.edu.au

http://wwf.panda.org/about_our_earth/blue_planet/problems/problems_fishing/fisheries_management/bycatch222/

<http://www.afma.gov.au/sustainability-environment/bycatch-discarding/>

Youtube

What is Bycatch? 2:01

A Cartoon Crash Course
<https://www.youtube.com/watch?v=NklxOhr2fal>

Reducing bycatch in the fishing industry 1:24

<https://www.youtube.com/watch?v=3sk8CyTnDw>

New Fishing Net Designs 4:04
<https://www.youtube.com/watch?v=HhQFUWbVkbA>

Industry Links

Fisheries WA, Albany Office
08 9845 7400
South Coast Education Programs

Australian Curriculum Links

FOR BIOMES #2

Cross-Curricula Priorities		Aboriginal and Torres Strait Islander Histories and Culture	Asia and Australia's Engagement with Asia	Sustainability			
General Capabilities	Literacy	Numeracy	ICT Capability	Critical and Creative Thinking	Ethical behaviour	Personal and Social Capability	Intercultural Understanding
Science Content Strands	Science Understanding		Science Inquiry Skills	Science as a Human Endeavour			
Sub Strands Outcomes			Planning and Conducting ACSIS165 ACS616 Processing and analysing data and information ACSIS169	Nature and Development of Science ACSHE158			
Mathematics Content Strands	Number and Algebra		Measurement and Geometry	Statistics and Probability			
Sub Strands Outcomes			Using Units of Measurement ACMMG219 Geometric Reasoning ACMMG221	Chance ACMSP225			
English Content Strands	Language		Literature	Literacy			
Sub Strands Outcomes	Expressing and Developing Ideas ACELA1561			Interacting with Others ACELY1811 ACELY1741 Creating Texts ACELY1746			
Geography Content Strands	Geographical Knowledge and Understanding		Geographical Inquiry and Skills				
Sub Strands Outcomes	Biomes and Food Security ACHGK060 ACHGK061 Geographies of interconnections ACHGS067		Communicating ACHGS070				
Design and Technologies Content Strands	Design and Technology Knowledge and Understanding		Design and Technologies Processes and Production Skills				
Sub Strands Outcomes	Knowledge and Understanding ACTDEK043		Processes and Production Skills ACTDEP048 ACTDEP049 ACTDEP051				

Forest Biomes #3 ❁❁❁

KEY FEATURES

- Forest Biomes represent the largest and most ecologically complex systems.
- They contain a wide assortment of trees, plants, mammals, reptiles, amphibians, invertebrates, insects and micro-organisms which vary depending on the zone's climates.
- The largest of the land biomes is the boreal, or Taiga biome. Taiga biomes can be found in areas with shorter, warm summers and long winters.
- Temperate deciduous forests are a close relative of the Taiga biome, and can be found in areas with a milder, shorter winter season.
- Other forests which fall between the boreal and temperate classification include moist evergreen forests, moist evergreen and broad-leaf forests, dry evergreen forests, Mediterranean forests, temperate evergreen forests, and temperate broad-leaf forests.

ISSUE: CROPPING WITHOUT DEFORESTATION

SCENARIO: "The biggest driver of deforestation is agriculture." So this statement resonates around the world. It seems to be that we are at the crossroads of how to strike a healthy balance so that farmers can farm, while minimizing the amount of land clearing that needs to occur. Your team has this amazing idea that the land can be shared – by growing crops above the trees. Can it be done? Conservation companies will gladly assist financially if it means there will be minimal loss to the trees. The sky is literally the limit with this planning, however it must be a 'real crop' that you will plan for (you cannot make up an imaginary one that doesn't need water or soil!) and you need to consider all of the elements of crop production from planting to harvesting.

- OBJECTIVE:**
1. Plan and design a system that makes use of space above forests for agriculture.
 2. Incorporate and plan for all elements of crop production such as; planting, irrigation, fertilising, harvesting and transport
 3. Deliver this plan and design to prospective farmers and conservationists (teachers) in a written format accompanied by a 7 – 10 minute presentation.

Continued over.

Forest Biomes #3 ❀❀❀

Digital Resources

<http://eschooltoday.com/forests/what-is-deforestation.html>

<http://www.onegreenplanet.org/animalsandnature/this-is-how-animal-agriculture-causes-deforestation/>

<http://everydaylife.globalpost.com/deforestation-impact-australias-ecosystems-42805.html>

Industry Links

Forest Products Commission
Head Office, Kensington
08 9363 4600
www.fpc.wa.gov.au/education

Youtube

CNN Explains: Deforestation 2:22
https://www.youtube.com/watch?v=M4jhjt1_eyM&spfreload=10

What is Deforestation? 2:52
<https://www.youtube.com/watch?v=yvdfqrvu6Q>

What is Deforestation? 1:44
<https://www.youtube.com/watch?v=QoTSpodE73E>

Australian Curriculum Links

FOR BIOMES #3

Cross-Curricula Priorities		Aboriginal and Torres Strait Islander Histories and Culture	Asia and Australia's Engagement with Asia	Sustainability			
General Capabilities	Literacy	Numeracy	ICT Capability	Critical and Creative Thinking	Ethical behaviour	Personal and Social Capability	Intercultural Understanding
Science Content Strands		Science Understanding	Science Inquiry Skills	Science as a Human Endeavour			
Sub Strands Outcomes		Biological Sciences ACSSU176	Planning and Conducting AC SIS165 ACS616	Nature and Development of Science ACSHE158 Use and influence of Science ACSHE228			
Mathematics Content Strands		Number and Algebra	Measurement and Geometry	Statistics and Probability			
Sub Strands Outcomes		Real Numbers ACMNA208	Geometric Reasoning ACMMG221				
English Content Strands		Language	Literature	Literacy			
Sub Strands Outcomes		Expressing and Developing Ideas ACELA1561		Interacting with Others ACELY1811 ACELY1741 Interpreting, analysing, evaluating ACELY1742 Creating Texts ACELY1746			
Geography Content Strands		Geographical Knowledge and Understanding	Geographical Inquiry and Skills				
Sub Strands Outcomes		Biomes and Food Security ACHGK060 ACHGK061 ACHGK062 ACHGK063 ACHGK064	Observing, questioning and planning ACHGS063 Communicating ACHGS070 Reflecting and Responding ACHGS071				
Design and Technologies Content Strands		Design and Technology Knowledge and Understanding	Design and Technologies Processes and Production Skills				
Sub Strands Outcomes		Knowledge and Understanding ACTDEK040 ACTDEK043	Processes and Production Skills ACTDEP048 ACTDEP049 ACTDEP051				

Desert Biomes #4 ❁❁❁❁

KEY FEATURES

- Temperatures exhibit daily extremes because the atmosphere contains little humidity to block the Sun's rays.
- Rainfall is usually very low and/or concentrated in short bursts between long rainless periods.
- Soils are coarse-textured, shallow, rocky or gravelly with good drainage and have no subsurface water.
- Canopy in most deserts is very rare. Plants are mainly ground-hugging shrubs and short woody trees.

ISSUE: EFFECTIVE IRRIGATION

SCENARIO: According to Brian Merchant (www.treehugger.com, 2010) 38% of the World's Land is in danger of turning into desert, with Australia having a high risk factor of desertification occurring. Australian farmers want to extend their farming practices to include farming in arid areas. With Australia having a large desert area, and farmers wanting to avoid over farming the land they do have, it makes sense to try and use the land that is available.

Crops will only be viable if they have enough water. Irrigation is the main source for water in these areas. However, irrigation in desert areas is not without its problems, with evaporation being one of the main ones. You have been asked by a local irrigation company to research and develop new materials, layouts and preventative measures to ensure evaporation rates are reduced. You will present your findings to the company, reviewing what has been done in the past and how your new design will reduce some of the issues they are currently experiencing.

You will need to select an area of Australia that you will focus your irrigation plan on, identify your water source and also what type of crops this system will be most effective for. You will also need to provide estimates of the cost of purchasing the items you need for the irrigation set up (e.g. how many metres of irrigation pipe do you need?).

- OBJECTIVE:**
1. Research and present data on current irrigation practices and identify problems associated with these practices.
 2. Identify and design new irrigation systems that alleviate the current problem.
 3. Discuss and justify reasons for area and crop selection

Continued over.

Desert Biomes #4 ❀❀❀❀

Digital Resources

<http://www.abs.gov.au/ausstats/abs@.nsf/Previousproducts/1301.0Feature%20Article16012008?opendocument&tabname=Summary&prodno=1301.0&issue=2008&num=&view=>

<http://www.alicespringsdesertpark.com.au/kids/desert/>

<http://www.irrigators.org.au/news>

<http://irrigation.org.au/about-us/about-australian-irrigation>

Industry Links

Department of Agriculture and Food WA
Water for Food Project
www.agric.wa.gov.au

IRRIGATION COMPANIES

Philmac
www.philmac.com.au/Products/Irrigation

Nelson Australia
www.nelsonirrigation.com.au

Netafim
www.netafim.com.au

Sundrop Farms
www.sundropfarms.com

Youtube

Subsurface drip irrigation 8:05
<https://www.youtube.com/watch?v=TvCD7p-Bvn4>

John Deere Water Irrigation System 3:17
https://www.youtube.com/watch?v=8C2q3I_Hd-Y

Australia Sugarcane Industry 9:57
<https://www.youtube.com/watch?v=rV7SkbsQfKk>

Growing crops in the Desert 2:07
<https://www.youtube.com/watch?v=FqHXdyM3yo>

Australian Curriculum Links

FOR BIOMES #4

Cross-Curricula Priorities		Aboriginal and Torres Strait Islander Histories and Culture	Asia and Australia's Engagement with Asia	Sustainability			
General Capabilities	Literacy	Numeracy	ICT Capability	Critical and Creative Thinking	Ethical behaviour	Personal and Social Capability	Intercultural Understanding
Science Content Strands		Science Understanding	Science Inquiry Skills	Science as a Human Endeavour			
Sub Strands Outcomes		Biological Sciences ACSSU176	Planning and Conducting AC SIS164 AC SIS165 AC SIS166 Processing and analysing data and information AC SIS169 AC SIS170	Nature and Development of Science AC SHE158			
Mathematics Content Strands		Number and Algebra	Measurement and Geometry	Statistics and Probability			
Sub Strands Outcomes		Real Numbers AC MNA208 Linear and non linear r'ships AC MNA296	Using Units of Measurement AC M MG219 Geometric Reasoning AC M MG221	Chance AC MSP225			
English Content Strands		Language	Literature	Literacy			
Sub Strands Outcomes		Expressing and Developing Ideas AC ELA1561		Interacting with Others AC ELY1811 AC ELY1741 Creating Texts AC ELY1746			
Geography Content Strands		Geographical Knowledge and Understanding	Geographical Inquiry and Skills				
Sub Strands Outcomes		Biomes and Food Security AC HGK060 AC HGK061 AC HGK062 AC HGK063 Geographies of interconnections AC HGS067	Observing, Questioning and Planning AC HGS063 Interpreting, analysing and concluding AC HGS067 Communicating AC HGS070				
Design and Technologies Content Strands		Design and Technology Knowledge and Understanding	Design and Technologies Processes and Production Skills				
Sub Strands Outcomes		Knowledge and Understanding AC TDEK040 AC TDEK041 AC TDEK043	Processes and Production Skills AC TDEP048 AC TDEP049 AC TDEP050 AC TDEP051 AC TDEP052				

Assessment

The million dollar question is - **how** do we assess these tasks. Teachers have at their disposal a multitude of types of assessment which can include; checklists, rubrics, rating scales and formalised tests. I firmly believe that assessment should be **contextualised** to the students and content that they are currently involved. As stated in the Australian Curriculum;

Assessment of student learning takes place at different levels and for different purposes, including: ongoing formative assessment within classrooms for the purposes of monitoring learning and providing feedback, for teachers to inform their teaching, and for students to inform their learning.

I have used rubrics as the main form of **assessment in this program. Remember, children need to be shown** what and how they will be assessed so this can assist them with deciding what information will be included or omitted. Regarding the integration, in an ideal world the students' presentation would be delivered to **all the subject teachers** as those teachers would then mark in their subject area. If this is not ideal, then I would suggest students' **video their presentations** which could then be viewed by the integrated subject teachers for them to add their assessment. The **SAME** marking guide would be used for multiple teachers; however those teachers would only mark in their outcome area.

I am also a firm believer that the **students use the rubric** constantly **during** the process of the activity. I would compile with the students the characteristics of what **'below, at and above standard' look like** and **explicitly teach** how to include these characteristics in their projects. I believe this needs to be done in each **individual subject area** to ensure children are aware of what individual **teacher expectations** are.

EXAMPLE OF RUBRIC FOR ACTIVITY BIOME #1

Name: _____ Date: _____

OBJECTIVE	AC OUTCOMES	BELOW STANDARD (Assistance required)	AT STANDARD (On the right Track)	ABOVE STANDARD (Wow)
Planned, designed and created a model of an Australian Grassland model	ACSSU176 ACMMG221 ACHGK060 ACHGK063 ACTDEP049			
Delivered a presentation outlining the importance of the role of grasslands	ACELA1552 ACELY1811 ACELY1741 ACHGS070 ACSHE228			
Participation and engagement	General Capabilities			