

Every Drop Counts – An Exploration into Water Conservation and Drought for Early Years Students (K-2)

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ABSTRACT: The current drought was the inspiration for the Every Drop Counts (EDC) session aimed at early year's students K-2. The challenge arose with kindergarten teachers wanting to educate their students about what the drought meant for Adelaide's water supply. This prompted some brainstorming, creation, development and review at Waterwatch Central Adelaide to develop a relevant education session.

This new session was trialed in a kindy with teacher feedback incorporated into the session. It continues to be improved through evaluation, review and further development from the feedback provided by teachers who have an Every Drop Counts session. EDC has proven popular and the response has been very positive. Valuable feedback has enabled us to target the 3-6 age-groups and create a resource that clearly illustrates the issues of limited water availability, implications for our future and the need to conserve water resources.

INTRODUCTION

In South Australia, a kindergarten (also called pre-school) is attended by children for up to four consecutive terms before they start primary school. The pre-school provides education to these children prior to starting their school education. The Every Drop Counts session was developed in response to demand from kindergartens for support in their work to educate young children about the drought, water conservation and water restrictions.

Early years teachers wanted to tackle the water conservation topic, but were finding that there were few resources, if any, available for the 3-6 year old age-group. In addition, there were no other organisations in the region who had developed a presentation for this age group or who would visit schools/kindys to talk about the drought and the need to conserve our precious water.

This prompted Waterwatch Central Adelaide to develop an education session that would provide information at an appropriate level for the age group concerned, but also provide a hands-on activity that promoted student learning.

THE PROCESS

Brainstorming the Session

The team wanted to convey certain water issues as well as deliver the water saving message. Based on this, and in conjunction with ideas from kindergarten teachers, the following ideas were developed from the brainstorming session:

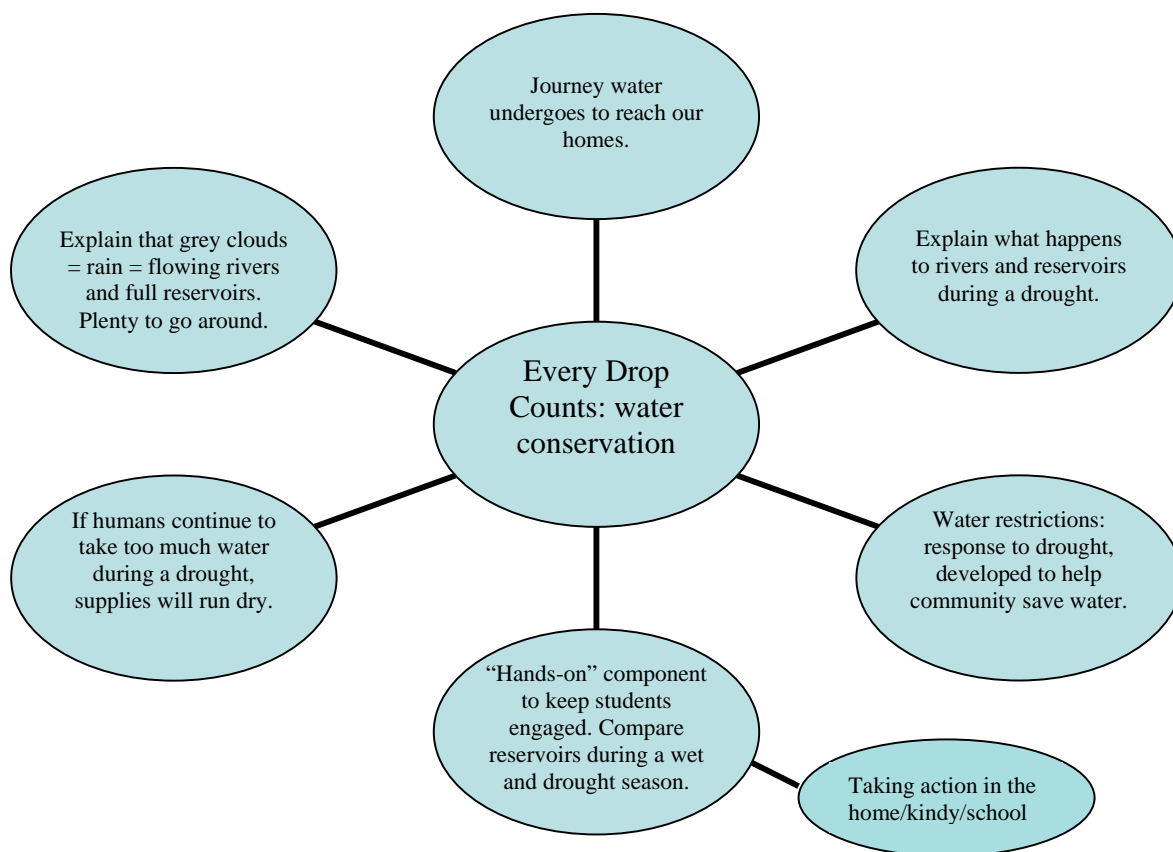


Figure 1: Brainstorming Map for Every Drop Counts Session

Before the session could be outlined in greater detail, some outcomes or learning goals of the session were required. The following goals were developed and based on what Waterwatch Central Adelaide wanted students to be aware of by the end of the session. “Learning goals” was chosen as a suitable name as it is unrealistic to suggest that all outcomes would occur after one session. They are objectives or potential goals that with a bit of follow-up from teachers would hopefully lead to these learning goals being achieved.

The learning goals include:

- Identify that our drinking water is taken from natural waterways and is a limited resource.
- Observe the cycle/journey that water undergoes before it flows through our taps.
- Observe that humans are removing too much water from our waterways.
- Identify water use in home/kindy/school.
- Identify ways to save water at home/kindy/school.

Session Development

Due to the age of the target audience it was decided that large A3 photos would be very helpful in explaining the story of the journey of water to our taps, as well as the situation during a drought and the need for water conservation. For example, a dry river bed and flowing river, full reservoir

and low reservoir would be used to show students the differences within the environment during drought and non-drought periods and the changes in amount of water available for supply.

Photos were also taken in sets of two for activities that use water. One picture depicts a water-wasteful example of an activity (e.g. brushing teeth) and the second picture depicts a water-saving alternative. The aim is to ask students to compare the two pictures and to get them thinking about all the different activities at home and or kindy/school that use water. These pictures were taken so they could be used as cue cards if students were having difficulty identifying different water uses and ways for saving water.

During the brainstorming session it was decided that a hands-on component would keep students of such a young age engaged in the session, as well as providing visual representation of a reservoir and how the water levels can vary between normal and drought seasons. Tanks filled with water would be used to show how water levels change when water is taken from the reservoir and to show how much water is used to carry out everyday activities such as having a bath or shower or flushing the toilet.

When students provide a water-using activity they are invited to take water from the first tank and place into the bucket. A large cup was used for this part of the exercise to represent using a lot of water. Next, students suggest ways they could save water whilst participating in those same activities, only this time they would remove water from the second tank with a smaller cup, representing water saving by extracting less. Students could then be asked to compare both tanks of water to see how far the water level had dropped when just using the water for activities and then when a conscious effort was made to conserve the water.

Upon review of the session and based on feedback received, the tank of water representing our reservoirs has been most valuable in helping students to understand the concept of a reservoir, a place where public water is stored until it is required in our home to carry out everyday activities.

The Trial

Following the development stage, the session was trialed at a kindy to gauge its effectiveness at delivering the message of water conservation, drought and the learning goals. The teachers provided verbal feedback at the conclusion of the first Every Drop Counts session.

The initial session outline in brief: (note bold type refers to names of individual pictures in the Every Drop Counts poster series)

- Tune students in by asking the following questions
 - What do you already know about water?
 - Where does water come from?
 - Do you know the journey water takes to get to your taps?

- Explain the two tanks at front of classroom. Explain that they represent a reservoir (you may need to explain what a reservoir is) where the water that we use in our homes and at school comes from.

- Using the Every Drop Counts Photo Series talk students through how water gets to our homes in an ideal, non-drought situation. Talk about the **rain clouds** bringing rain to fill up

our **rivers**. When the rivers are flowing they can fill up our **reservoirs**. Water is then pumped to a **filtration plant** to remove dirt and germs so we don't get sick when we use the water. Water can then be distributed to our homes via **pipes** and when we turn on our **taps** water flows through them.

- Ask the students to identify where and how they use water (show the posters that depict these actions if students are having trouble). When a student provides an answer invite them to remove a cup of water (using large cup) from the tank (tank 1). Tip the cup of water into bucket 1. Watch the water level drop and observe.
- Follow this interactive activity with the Drought situation posters, which show the students what the current situation is/could be if we do not receive enough rain and people continue to use the same amount of water they use during non-drought conditions.
- Talk students through **sunny sky** poster. Explain that if we have too many days of warm clear skies, we receive very little, if any, rain. If there is no rain, our **rivers** will not flow but instead **dry up**. If the rivers don't flow then the reservoirs do not get refilled and the reservoir levels drop (**low reservoir**). Compare this reservoir picture with the **full reservoir** picture shown earlier. As a result of the drought, the government has introduced some rules, **water restrictions**, which help us to save water outside our homes and these encourage us to also use less water inside the home.
- Ask students to think of ways to save water around the home. Use the posters as cues if children have any trouble. Explain how they can use less and why different actions use less water. Using the second tank of water, when students make a water saving suggestion, ask students to remove a cup of water, using a small cup to represent reduced water use. Tip the water into bucket 2.
- Ask students to compare the two tanks. Try to get them to recognise that by using less water there will be more left over for the future. Also, if everyone saves just a little bit of water, by choosing to have shorter showers or always pressing the half flush on the toilet, we can all make a big difference towards water conservation.
- Re-iterate that without much rain, there is less water in our rivers and reservoirs – like in our current drought. This means we need to be careful with the way we use water. Take students on a tour of the kindy/school, ask students to identify where water is used – this will help to provide examples where they can begin to take immediate actions to conserve water.

This first session was different from the current format of EDC, following feedback from kindergartens and presenters after the initial sessions.

Feedback Received from the Trial

The feedback from the teachers at the trial kindergarten session was very positive. They did however make a few suggestions to help the session run more smoothly and help the younger children relate to the idea of water conservation.

Suggestions made include:

- Asking the children to identify their water use *that morning* before they came to kindy.
- Ask students to identify the clouds as place where water comes from in the form of rain.
- Use one aquarium instead of two. Use a texta to show the water level at the very beginning of the session. After water is removed with the big cup, draw another line to show where the water level has dropped. Draw another line after removing the water with a small cup. Ask children to compare the difference between the water levels. This was suggested as some children may have difficulty with comparing water levels in two different tanks, as their perception and ability to gauge is different from an older student or adult.
- Use graphics on the aquarium e.g. stick a clip art of rain onto tank whilst talking about our river/reservoir systems in non-drought situation and sun whilst talking about drought scenario. This is so students can associate lower reservoir levels with drought and lots of sunny days with no rain and higher reservoir levels with grey rain clouds/rainy days.
- Simulate rainfall into tank when showing rain cloud picture. Simulate no rain when showing the sunny sky photo.
- As a revision exercise, ask students to remember one way they could help to save water. Or ask them as a group to come up with three.

This feedback was incorporated into the current Every Drop Counts session. Since the session was developed, there has been quite a demand in schools and kindergartens. Every Drop Counts has also been made available for Yrs 1 and 2. Junior Primary teachers have appreciated the availability of a session on water conservation and drought and this has been noted in the number of bookings for sessions, with 63% of participating groups being schools and 37% kindergartens.

EVALUATION PROCESS

In order to continually improve Every Drop Counts, an evaluation form was given to each class teacher whose class participated in the session. Evaluations have been provided to each teacher since March 2007. The aim of the evaluation was to not only ensure that the session learning goals were being covered and or met, but to receive feedback so as to continually improve on the original idea, develop it (incorporate new feedback), test new material/changes and review.

A total of thirty-two sessions were run between the period March to November 2007 for which evaluation forms were distributed; thirty of these were returned. A majority of the feedback was from junior primary teachers. This is because when school bookings were made, schools generally booked the whole R-2 year level in for the session and each class had a different teacher, thus there were up to 8 evaluations per school. On the other hand, kindergartens would book between 1-2 sessions and the same teachers were present for multiple sessions, thus only one evaluation was completed.

The Every Drop Counts session was not designed to be a stand alone session, but rather to work in conjunction with the work teachers had been doing in class. Based on this the following questions were asked.

The Results

1. Did the session meet its learning goals and enable students to:

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
a) Identify that drinking water is taken from local waterways and is a limited resource	40	57	3	-	-
b) Observe the cycle that water undergoes before it flows through our taps	33	63	3	-	-
c) Identify that humans are removing too much water from our waterways	50	50	-	-	-
d) Identify water use in the home/kindy/school	53	47	-	-	-
e) Discuss ways to conserve water at home/kindy/school	57	43	-	-	-

A majority of the teachers either agreed or strongly agreed to the session meeting the learning goals. It appears that goals (a) and (b) are not being met as well as (c), (d) and (e), with more people agreeing than strongly agreeing that the goal was met, and 3% were not sure. During the session water is identified as coming from local waterways, but perhaps this also needs to be followed up and included within the conclusion. Water as a limited resource is covered throughout the session as it is the underlying theme.

It is highly probable from the response to learning goal (b) that teachers were expecting the water cycle to be covered. In this case goal (b) is worded badly, because the intention was to provide students with a picture story of water's journey from rainfall to our taps, not the water cycle. Goal (b) will therefore be reworded to read "*observe the journey water undergoes from rainfall to our taps*" for future feedback forms and program guides. From the results of the evaluation, goals (a) and (b) need to receive greater focus and perhaps be re-iterated throughout the session and it is suggested that teachers follow these up in class.

Comments:

- "Many of the children retained a lot of the information".
- "Large photos – good. Explanation good".
- Was a great introduction for children about saving water. Can continue learning about topic further – has made them start thinking".
- "Excellent session, interesting and informative".
- "They were able to join in. They like having their say and letting you know what they can do".
- "Excellent photos and aids (waters tank, bucket etc)".
- "It was interesting that most children thought that sprinklers saved water (not trigger on hose)".
- "The use of the tank was very visual".
- "Fantastic presentation".
- "Excellent presentation/very effective use of simple resources".
- "Good pictures and demonstration".
- "Very interesting session. Children listened well and gained a lot of information".

- “Very clear, appropriate to children’s understanding and concentration”.
- “Class had a good understanding of water usage etc. We have done a lot to work on H₂O”.
- “Students gained an insight into the source of our water supply and how it is filtered for personal use”.
- “☺ It was a great presentation. It was good at the end of the presentation the children said how they were going to save water”.
- “Thanks for coming along to talk to the class. The children were involved and happy to answer questions. The session is fairly long and I would suggest a break/stretch/song halfway through”
- “Great Idea to use 2 different size cups to demonstrate the two different scenarios of water usage”

2. Was the format of the session suitable for your class? How and Why? Was the hands-on component useful in student understanding? Would you change anything, if so, what?

- “The session was suitable – particularly the visual and hands-on part e.g. children putting water into the container”.
- “Subtraction of water in larger + small amounts – visual – good”.
- “Yes it was very relevant for receptions. Very visual and interactive. Liked the idea of posters and removing water (keep them engaged)”.
- “Hands-on useful – but not all children were involved. In a class of active 5 year olds – many boys – to sit and listen all the time is a bit difficult – I know time is a factor, but would be good if children could be in groups at some stage and all do some kind of activity”.
- “Very good format. Varied and interesting – kept children engaged throughout. Hands-on component excellent”.
- “Yes – more interaction of the children would have been good”.
- “Yes the photographs were excellent and the concept of taking water really was a good visual”.
- “Very clear presentation. Excellent hands-on component”.
- “A good visual for students to relate to. I will link this to maths – measurement and students can measure ‘saved’ water”.
- “Great pictures to illustrate saving water devices. Students this age need hands-on – so the resources used were excellent”.
- “Perhaps a bit more active participation, maybe acting out how they use water, maybe a familiar song e.g. ‘This is the way we...’”.
- “Yes, as much as possible. A song? A dance? I saw Danny the Drip a few years ago – that really worked well – more 3D + visual”.
- “It was really great for the children to have the opportunity for the hands-on experiments. It made the children concentrate more. Photographs were very useful for the children’s understanding”.
- “It was really helpful and covered everything. Explaining the term drought and showing clouds was a great way for children to understand. They remained interested the whole presentation”.
- “Excellent format presented well for year 1 and 2 level – good simple examples – easy to explain for children”.
- “Yes – good involvement and time allocation. Great thank you”.
- “Yes maintained their interest. Tanks of water immediately ‘grabbed’ their attention. Posters interesting and explained well. Good participation for children”.
- “Yes – photographs used. Used students to remove water from the tank”.

- “Yes – clear, interesting some hands-on and child participation. No I wouldn’t change anything”.
- “Very useful. Children were pre-prepared and this assisted involvement”.
- “Yes very appropriate to age level and kept class’ interest through interaction and involvement”.
- “Session was great, children very involved”.
- “Yes most engaging. The class got a lot out of it”.
- “Maybe use the whiteboard to reinforce some of the content e.g. a dam – the river flowing to a reservoir. The key words etc”.
- “Yes by revisiting aspects of a topic which we covered in term 2”.
- “The gradual transition from reservoir to tap enabled students to get a better understanding of the need to be mindful of usage – the posters showing contrast water level were very valuable”.
- “Yes it was a valuable session, it was obvious by the children’s interest and the way they became engaged that it was a suitable session”.
- “Yes it was suitable for the class. The pictures, bucket and the tank, were great for the children as they were able to see visually what was happening. The children were very engaged towards the end they were getting a bit restless”.
- “The children really enjoyed the morning. The visual props were great and nice clear photos for the children to compare. The children were given some good ideas for saving water”.
- “Yes fitted very well into our water unit which focuses on water as an essential resource”.

3. Did you have appropriate resources to introduce or expand on the topic with your students? If not, what did you need?

- “Yes”.
- “Excellent resource – now carry on info imparted”
- “I didn’t really have any resources introduced through discussion. Maybe a poster showing people saving water would be good”.
- “I could find them – it’s just finding time”.
- “Yes I used the session to reinforce what we have been learning in class so far”.
- “Reiterated some of previous topics”.
- “I have a great deal of resources to complement this session. Would love pictures like car washing, toilets, garden watering, could possibly get more off the internet”.
- “The photos were excellent. They might be a useful resource to purchase, if at a reasonable cost”.
- “I would have liked to have access to photographs or posters to use with children”.
- “Good clear pictures to help presentation”.
- “Yes, many thanks”
- “Yes – do need more books, posters – your photos to copy would be great”.
- “Yes – used handbook provided for 1st term’s learning. Children thoroughly enjoyed and have good understanding of the topic”.
- “Yes thank you”.
- “.....presentation consolidated our learning about water conservation – using a constructivist approach. P.S. can I have a copy of Level 3 water restrictions if possible”.
- “Yes – used a good variety which had the children’s interest”.

The reasoning for asking the above question was to establish if there were enough resources 'out there' to support teachers in their work on drought and water conservation. This would help us in determining whether there was a gap in resources available for the K-2 age group, and perhaps to develop resources or source some that would be suitable for 3-6 year olds.

POSITIVE OUTCOMES

There has been a very positive response to the Every Drop Counts session. A program guide was sent out at the beginning of the year advertising the new session and a few bookings were taken from this, however it seems that the biggest response has been through word of mouth and general phone enquiries.

It seems that there is some difficulty in obtaining resources for the 3-6 year olds that cover water conservation. As a result several kindergartens have purchased the EDC photo series, which includes 26 laminated A3 photographs, icons to stick on the tank and session instructions. Additional items that are not included are the tank and bucket. This equipment is all that is required run the session. Kindergartens that have purchased the pack have stated that it is a *"great resource, there isn't anything out there with pictures for this age group"*. Kindergartens have been using the photos to follow-up and reiterate the message of saving water. Some kindergartens have included the photos within their range of educational kits for children to take home and explore.

Another positive result has been the way in which some groups prepare the children prior to the session. One kindergarten took photos of all the places at kindy that water is used e.g. the sand pit, hose, drinking fountains, water play trough, toilet, kitchen sink, bathroom sink and made a poster with the photographs. This was very helpful for the running of the session but also in consolidating children's ideas about the activities they do each day that use water. It meant that there was a greater response from the students and not a response of *"I use water by turning on the tap"*, but rather *"I use water to brush my teeth"* or *"I use water to clean out my fish tank"* and *"I use water when I have a shower"*.

The response from junior primary teachers has also been very positive with a number of teachers borrowing the EDC photo series kit. Pictures and cards have been received from some students who have participated in EDC and it is clear from these that the students have learnt a lot about different ways to save water. Making the session most valuable in consolidating the work they have completed in class.

There have also been requests to deliver EDC to older year levels. However, due to the content, it is not really appropriate for older year levels as it is specifically aimed at kindergarten to year 2. However, a resource pack for year levels 3-7 has been developed for teachers wanting to tackle water issues. The resource includes information and activities that cover local, national and global water issues. Information includes the water cycle, water in the local River Torrens catchment, River Murray water supply/national water use and global water issues such as access to water and scarcity.

CONCLUSION

The Every Drop Counts session has been successful in delivering the water saving message to children. The initial trial and the evaluation process have been most valuable in tailoring a session that meets the needs and abilities of kindergarten children through to year 2 students. Feedback from the evaluations is constantly being integrated into later sessions to ensure that EDC remains relevant and appeals to all children. The hands-on component not only illustrates water use in our homes, kindys and schools but is also a helpful tool for keeping the children engaged and allows them to be actively involved in the session. The photographs have been a very popular tool for showing the journey of water to our homes, allowing children to observe how river and reservoir levels change in both normal and drought circumstances as well as how human consumption will affect how much water will be available in the future. This is dependent on whether humans continue to 'waste' water or change their behaviours and save water to ensure our supply for the future.

Waterwatch Central Adelaide is currently in the process of surveying all groups who participated in a Waterwatch session in 2007, to see what actions, if any, they have taken towards the improvement of the environment as a result of the knowledge they have gained from Waterwatch sessions and follow-up work. Responses from these surveys will also be factored into the content and delivery of the Every Drop Counts session.

The Every Drop Counts photo series resource is available for purchase from:
Waterwatch Central Adelaide, ph: (08) 8234 7255.