



National Curriculum Development in Climate Change Mitigation and
Adaptation and Disaster Risk Reduction
St. Vincent and the Grenadines



Module 3

Secondary School

Form 3

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Strand 1: Hazards & Disasters
Unit 1: Towards a Resilient SVG
Topic 1: Resilience

Activity 1: Bouncing Back, Bouncing Forward

Purpose: Understanding the basic idea of resilience; critically reflecting on the notion of ‘bouncing back’ and considering the better alternative of ‘building back better’ (‘bouncing forward’) after a hazard/disaster event

Time needed: 45 minutes

Resources needed

- A flexible stick, a rubber band, a rubber ball, an eraser and/or any other everyday object that, if bent, pulled, or squeezed out of shape, return to its original shape when released
- Blackboard and chalk

Procedure

Step 1: Use the bendy/stretchable/squeezable objects to demonstrate the capacity to ‘bounce back’ by bending them, stretching them and squeezing them and allowing them to return to their original shape. Invite students to try too! (5 minutes)

Step 2: Joining together in pairs sitting on the floor or chairs facing each other, ask students to sit quietly for a few moments and think about times when they have ‘bounced back’ after experiencing some difficulty or setback. It may be, for example, after a sports defeat. It may be after someone has said something unkind. Also, ask them to recall and think about the qualities they needed to draw upon in ‘bouncing back.’

Ask each pair to nominate person ‘A’ and person ‘B.’ Then ask ‘B’ to tell ‘A’ those personal ‘bouncing back’ stories they feel happy to share, with ‘A’ listening carefully to what is said. After two minutes, reverse the process, so ‘A’ tells ‘B’ their stories, and ‘B’ listens carefully.

Then ask pairs to discuss the ‘bouncing back’ qualities revealed by their individual stories. Were they similar? Or were different qualities shown in different circumstances? (10 minutes)

Step 3: Conduct a whole class brainstorming of ideas focusing on the ‘bouncing back’ qualities thrown up by the stories, all ideas being written up on the blackboard. (10 minutes)

Step 4: Explain that the ability to ‘bounce back’ from difficult circumstances is ‘resilience.’ Encourage the class to discuss whether the same qualities of resilience are needed in a community after it has been hit by a natural or a human-made disaster. What qualities were required for communities to ‘bounce back’ from

disasters such as hurricanes, landslides and earthquakes in SVG? In the discussion draw upon the definitions and ideas presented in *Box 1* and *Box 2* as appropriate. (20 minutes)

Box 1: Resilience

The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management.

Source: Taken from UNISDR <https://www.unisdr.org/we/inform/terminology#letter-r>

Resilience at the individual level is the ability to apply knowledge to minimize risks, to adapt to emergency situations, to withstand shocks, and to rapidly resume learning and other life-sustaining activities. Resilience can be strengthened when factors underlying vulnerability are addressed. Resilience is the opposite of vulnerability. Resilience is reinforced when the 'inherent' strengths – of individuals and systems – are identified and supported.

Source: Taken from: Selby & Kagawa. 2014. *Towards a Learning Culture of Safety and Resilience: Technical Guidance for Integrating Disaster Risk Reduction in the School Curriculum*. UNESCO/UNICEF.

Box 2: Build Back Better

Building Back Better (BBB) is an approach to post-disaster recovery that reduces vulnerability to future disasters and builds community resilience to address physical, social, environmental, and economic vulnerabilities and shocks. Recovery within a BBB framework gives impacted communities the chance to reduce risk not only from the immediate hazard but from threatening hazards and conditions as well.

Source: Taken from: GFDRR. *Building Back Better in Post-Disaster Recovery*. https://www.recoveryplatform.org/assets/tools_guidelines/GFDRR/Disaster%20Recovery%20Guidance%20Series-%20Building%20Back%20Better%20in%20Post-Disaster%20Recovery.pdf

Potential/Facilitation Tips

This activity will help students internalize the concept of resilience. Be sensitive to the fact that sharing stories can be very emotional in its revelation of both strengths and vulnerabilities.

For *Step 4*, a critical question concerns the degree to which personal 'bouncing back' qualities are the same qualities that communities need during and after experiencing difficult times and crises. Encourage the class to ask whether 'bouncing back' is enough in a post-disaster situation. Is the idea of returning to how things were before the disaster sufficient, or do communities need to learn from what happened, make changes and adapt? Would it be better to talk of 'bouncing forward' or 'building back better'? Offer some SVG-specific examples of how communities have 'bounced forward' or 'built back better' in the wake of a disaster.

Curriculum Links

This activity can be picked up under the 'Disaster Preparedness' learning outcome in the Form 3 Health and Family Life Education syllabus, which includes the indicators that students 'examine disaster preparation strategies for SVG' and 'demonstrate the ability to respond appropriately at different stages of a disaster.'

Adapted from Selby, D. & Kagawa, F. 2013. *Climate Change in the Classroom: UNESCO Course for Secondary Teachers on Climate Change Education for Sustainable Development*. Paris: UNESCO.

Strand 1: Hazards & Disasters
Unit 4 1: Towards a Resilient SVG
Topic 2: NEMO's Work in SVG: Case Study

Activity 2: NEMO Case Study

Purpose: Understanding the key roles and functions of the National Emergency Management Organisation (NEMO) in St Vincent and the Grenadines

Time needed: 100 minutes (40 minutes for *Stage 1*, 60 minutes for *Stage 2*)

Resources needed

- Computers with internet access per group (optional)

Procedure

Stage 1

Step 1: As a whole class, ask students to share what they know about the National Emergency Management Organisation (NEMO) for a few minutes. Then give a general and brief overview of NEMO, drawing upon the information from *Case Study 22* in the *Resource Manual* and the NEMO website (<http://www.nemo.gov.vc/nemo>) (10 minutes)

Step 2: Tell the class that a NEMO officer will be visiting the school and that they will have an opportunity to ask questions to understand the organization's work better. Divide the class into six groups and assign one of the following topics to each group: NEMO and hurricanes; NEMO and landslides; NEMO and tsunamis; NEMO and earthquakes; NEMO and flooding; NEMO and volcano eruptions. Have them come up with a list of questions on the topic they would like to put to the NEMO officer. Have them look at the NEMO website in preparing their questions. Give some space for class sharing and discussion of questions developed. (30 minutes)

Stage 2

Step 1: Welcome the NEMO officer to the class and introduce her/him to students. Ask the guest to present NEMO's work and how it contributes to community and school safety and resilience building in SVG. (15 minutes)

Step 2: Encourage students to put their questions to the guest speaker. The questions should be drawn from those they prepared but give space for questions spontaneously triggered by what they hear. Roughly apportion an equal amount of questioning time to each of the six groups. (45 minutes)

Extension

Allot class time for students to develop a display of NEMO's work to raise awareness among other students at school. This display can be in information sheets,

brochures, or artwork (e.g., poster or collage). Mount the show in a well-frequented part of the school and have students host it and respond to other students' questions. It should coincide with the International Day for Disaster Risk Reduction held each year on 13 October.

(<https://www.unisdr.org/disasterreductionday>).

Potential/Facilitation Tips

The class teacher needs to arrange the NEMO officer's visit well in advance through the NEMO office (784-456-2975), which is keen to support and work with schools. Explain to the speaker how the class time will be organized and ask them to explain how their work promotes safety and resilience at community and school levels.

Stage 1 aims at raising student awareness of NEMO before the NEMO guest speaker's visit. Having each group's hazard-specific questions formulated beforehand before the session with the guest speaker will help students become more attentive to the guest speaker's presentation.

In preparation for facilitating this activity, read case study 22 in the *Resource Manual*.

Curriculum Links

This activity aligns with the 'Disaster Preparedness' learning outcome in the Form 3 Health and Family Life Education curriculum, which indicates that students 'examine disaster preparation strategies for SVG'.

Strand 1: Hazards & Disasters

Unit 1: Towards a Resilient SVG

Topic 3: The International, Caribbean and SVG Disaster Management and Climate Change Agendas

Activity 3: International, Regional and National DRR and CCMA Agenda Exchange

Purpose: Analyzing key international, regional and national disaster risk reduction (DRR) and climate change mitigation and adaptation (CCMA) agendas; exploring the links, relationships and interfaces between the agendas examined

Time needed: 90 minutes

Resources needed

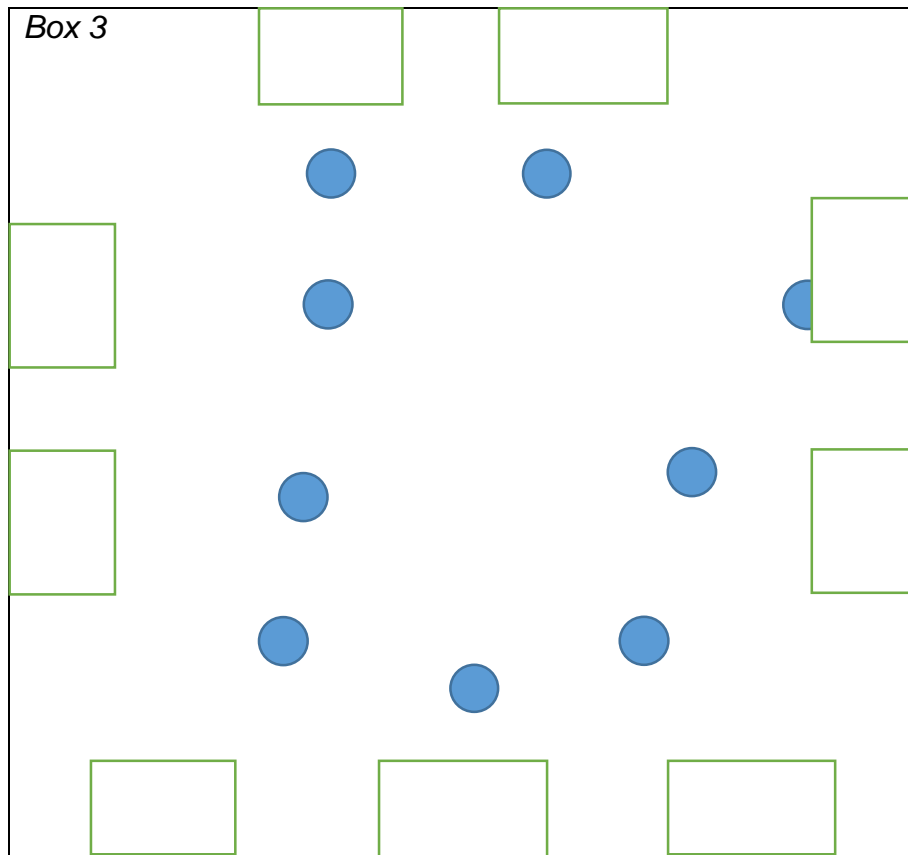
- A cut-up set of DRR/CCMA agenda cards
- A *Guiding Questions* handout per group
- An *Analyzing DRR/CCMA Linkages* handout per student
- A few sheets of chart paper and colour markers per group
- At least one computer with Internet access per group
- Nine balls of wool, each of a different colour
- Tape or other adhesive material for sticking charts to walls

Procedure

Step 1: Divide the class into nine groups. Assign one of the *DRR/CCMA Agenda* cards to each group. Also, give each group a *Guiding Questions* handout, sheets of chart paper and colour markers. Have at least one computer with Internet access available to each group. Explain that the group task is to prepare a short presentation (up to 3 minutes) on the agenda described on the card given to them. Explain, too, that they should use the guiding questions to analyze the agenda and organize the presentation. Tell them that some of the agendas are long and very technical, so their task is to capture the key ideas. (30 minutes)

Step 2: Before the group presentations start, distribute an *Agenda Linkages* handout to each student. Explain that as they listen to each group's presentation, they should consider any linkages and relationships between the agenda they have been working on and the agendas presented, writing their ideas down on the handout while listening to each presentation. Invite each group to present their agenda. (35 minutes)

Step 3: Ask one person from each group to stand in a circle and explain that they will be 'static' negotiators. Ask remaining team members to stand behind him/her and explain that they will be 'mobile' negotiators. Also, ask each group to place a sheet of chart paper on the wall behind them. (See *Box 3*, blue circles indicating static negotiators and green boxes indicating sheets of chart paper on the wall.)



Give a ball of wool to each 'static' negotiator. Ask her/him to tie the end of the ball of wool around their waist. Explain that their role is to stay in one position but to join in negotiations with any of the 'mobile' negotiators of the 8 other groups who come to them. Explain, too, that the role of the 'mobile' negotiator is to go out and negotiate connections, links, or relationships between agendas. Remind them that they should use notes written in *Step 2*. Each time a connection between two agendas has been discussed and agreed, the two balls of wools are passed across the circle and looped around the waists of the static negotiators of the two groups concerned (the ball of wool always being returned to the static negotiator by a mobile negotiator belonging to the same group). Have both groups 'mobile' negotiators record key points agreed on their respective chart paper. End by a reporting and reflection upon connections and relationships group by group and by the whole group. (25 minutes)

Potential/Facilitation Tips

The agendas dealt with in this activity differ significantly in style and length, some being very technical. Have students focus on the 'Preface,' 'Executive Summary,' 'Overview' or 'Homepage' sections if they exist to get a good broad understanding of the agenda.

A big message coming out of this activity is that DRR/CCMA is at its most effective if different agendas, local through global, are linked together.

As the activity continues through *Step 3*, a spider's web of connections between the nine agendas will be produced. Guiding discussion questions might include the following:

- What are specific linkages and relationships you have found between your own and other agendas?
- Was it difficult to find vertical linkages (national, regional to global/international)?
- Was it difficult to find horizontal linkages (i.e., linked agendas across one level)
- What coordination mechanisms should be in place to facilitate collaborations among agendas?

Discussion on the absence of connections can also be very productive as it might illuminate gaps and compartmentalization in agenda-setting.

Curriculum Links

This activity aligns with the 'Disaster Preparedness' learning outcome in the Form 3 Health and Family Life Education curriculum, which indicates that students 'examine disaster preparation strategies for SVG'.

Handout: DRR/CCMA Agenda Cards

Sustainable Development Goals (SDGs) 2015-2030

The Sustainable Development Goals (SDGs) address the number of global challenges through 17 internationally agreed goals.

Go to: <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>

The Paris Agreement for Climate Change, 2015

The Paris Agreement is a global agreement to respond to the threat of climate change.

Go to: https://www.un.org/ga/search/view_doc.asp?symbol=FCCC/CP/2015/L.9/Rev.1

The Sendai Framework for Disaster Risk Reduction 2015-2030

The Sendai Framework is an international agreement to reduce disaster risk substantially.

Go to: https://www.unisdr.org/files/43291_sendaiframeworkfordrren.pdf

The Comprehensive School Safety Framework

The Comprehensive School Safety Framework aims to reduce the risks of all hazards to the education sector.

Go to: https://www.unisdr.org/files/51335_cssbooklet2017updated.pdf

Regional Comprehensive Disaster Management (CDM) Strategy and Programming Framework 2014-2024

This aims to comprehensively manage all hazards through all phases of the disaster management cycle (prevention and mitigation, preparedness, response, recovery and rehabilitation) in the Caribbean region.

Go to: <http://dms.caribbeanclimate.bz/M-Files/openfile.aspx?objtype=0&docid=948>

Regional Framework for Achieving Development Resilient to Climate Change (2009-2015)

This *Framework* provides strategic approaches for climate change mitigation and adaptation in the Caribbean region.

Go to: <https://www.cdema.org/CDMStrategy2014-2024.pdf>

Caribbean Uniform Building Code (CUBic), 1985

CUBic provides appropriate building standards for the Caribbean region that, amongst other things, are aimed at protecting against Caribbean specific disaster threats.

- Go to: <https://www.caribank.org/publications-and-resources/resource-library/guides-and-toolkits/caribbean-uniform-building-code>

OECE Building Code, 2016

Based on the Caribbean Uniform Building Code (CUBic) providing appropriate building standards for the Caribbean region, OECE Building Code provides building standards for the Eastern Caribbean region including SVG.

Go to:

[http://ilandresilience.org/app/view/download/OECS%20Building%20Code%20\(7th%20Edition%20-%202016\).pdf](http://ilandresilience.org/app/view/download/OECS%20Building%20Code%20(7th%20Edition%20-%202016).pdf)

National Emergency and Disaster Management Act, 2006

This is the core law guiding disaster management and relief coordination in SVG.

Go to: <https://www.caribank.org/publications-and-resources/resource-library/guides-and-toolkits/caribbean-uniform-building-code>

Handout: Guiding Questions

Answer the following questions as much as possible:

- When was it created?
- Who has created it?
- Why was it created?
- What are its key goals/aims/objectives/priorities/strategies? What does it say about DRR and/or CCMA?
- Is it linking DRR and CCMA? Or is it focusing on only DRR or CCMA?
- Is it generally targeting specific sector(s), e.g. agriculture, forest, health, education, construction, transport, and the environment or populations? If the former, what are the sectors?
- Which level(s) is it targeting? Global/international? Regional (Caribbean)? National level?

Handout: Analyzing DRR/CCMA Linkages

Name of the Agenda Presented	Name of the Agenda Your Group Analyzed:
	Linkages and Relationships

Strand 2: Climate Change
Unit 2: Climate Changed Futures
Topic 1: Envisioning Climate Changed Futures

Activity 4: Picturing a Climate-changed Future

Purpose: Enabling students to envision a climate-changed future, articulate that vision, and learn of the future visions, hopes and aspirations, concerns and fears, of others; helping students enquire into how much climate change is intruding into personal and collective images and visions of the future.

Time needed: 45 minutes

Resources needed

- A half-sheet of plain paper for each student (one or two extra sheets per student for the *Extension* activity)
- A marker, crayon, or pencil for each student

Procedure

Step 1: Ask students to sit quietly on their own, think about the future in the light of climate change, and then draw their images and visions of a climate-changed future on the half-sheet of paper. Encourage them to interpret the task in their way but insist that they represent the future only through drawings, not the written word. They should not worry about the quality of their artwork! Repeat the instruction but do not elaborate further. (10 minutes)

Step 2: The drawing completed, ask participants to move around the room and form pairs or small groupings, sharing and explaining their drawings and learning about the images and visions of fellow students. They should move on to form different pairs and small groups in the time available, so they meet with a good cross-section of the class. (15 minutes)

Step 3: Facilitate a class discussion on what participants discovered and learned from sharing drawings. (15 minutes)

Extension

Have students meet up with one or two adult community members, inviting them to quietly draw their images and visions of a climate-changed future before putting questions to them about the thinking lying behind their drawings. Hold an additional class session or part-session for a sharing and explanation of what the adults they encountered drew and said (students should bring the drawings to class).

Potential/Facilitation Tips

This is a simple activity but one that can be profoundly revealing. The explanation of the nature of the task should be purposefully vague to encourage creativity and

resourcefulness. The sharing process will bring participants face to face with different perspectives on the future in light of encroaching climate change. Of critical interest will be the degree to which climate change impinges on images and visions of the future. Are students grasping how deeply climate change might affect their lives? Or, has a climate-changed future still to pervade 'business as usual' future hopes and expectations? Possible questions to trigger the *Step 3* discussion might include:

- Did you find common things to many, even all, drawings you saw?
- Did you find very different images and visions of the future? In general terms, were the images and visions *optimistic* or *pessimistic*?
- Did you find sheets with a mix of positive and negative future images, and how did the drawer reconcile the mix (e.g., a happy future family set beside an image of a worldwide hunger)?
- Were the images and visions *probable* (i.e., likely), possible (i.e., just might happen), or *preferred* futures?
- Did you find a mix of images of *personal* climate-changed futures, *local*, *national*, or *regional* climate-changed futures, or *global* climate-changed futures in what class members drew? Were some drawings limited in their scope in some way?
- Who has a role in helping bring about *positive* futures and preventing *negative* futures? What can we as individuals and groups of individuals do?

Curriculum Links

This activity complements the listening and speaking learning outcome of the Form 3 English syllabus concerning the articulation of goals, dreams and aspirations. It also marries with the Form 3 Integrated Science and Technology Earth Science syllabus in which climate change figures significantly. Achievement indicators under its 'Earth's Weather and Climate' theme require students to 'discuss the concept of climate change' and 'describe the effects of climate change on the human and natural environments' while indicators under its 'Earth's Resources' theme call on students to 'describe the adverse effects of man's activities on the environment' and to 'discuss the measures that can be taken to reduce/eliminate these adverse effects.' Additionally, the 'Places' theme in Form 3 Social Sciences curriculum has the following achievement indicators: 'examine the role human activities play in climate change;' 'examine the impact of global warming as a climatic phenomenon.'

Strand 2: Climate Change
Unit 2: Climate Changed Futures
Topic 2: Considering Future Scenarios

Activity 5: SVG Future Scenarios

Purpose: Considering future hazard and disaster-related scenarios in the Caribbean (and SVG, in particular) and considering what can be done now to realize a positive future and protect against a negative future

Time needed: 70 minutes

Resources needed

- A copy of the *SVG Climate Change and Disaster Risk Future Scenarios* handout for each student, and two extra copies for each pair if the *Extension* is attempted.
- A large sheet of paper and marker for each group of 6 (for the two brainstorming tasks)

Procedure

Step 1: Give each student a copy of the *SVG Climate Change and Disaster Risk Future Scenarios* handout. Working on their own, ask them to decide whether each of the twelve scenarios is *probable* (very likely to happen) in their lifetime, *possible* (might happen), *improbable* (not likely to happen), or *impossible* (definitely won't happen). Have them indicate their choice by drawing a circle around the word they choose. Also, ask students to decide whether each scenario is *desirable* (they would like it to come about) or *undesirable* (they would not like it to come about), circling the word of their choice. (10 minutes)

Step 2: Have students form pairs to share, explain and discuss their choices. If their partner's argument convinces them, they can change any of their choices by circling a new word and crossing out their original choice. (15 minutes)

Step 3: Ask pairs to join two other pairs to make groups comprising of six. Have each pair share, explain and discuss their choices. If any pair is convinced by what the other pair says, they can change their choice. Then ask the groups of six to choose one scenario about which all members agree that the future described is both *possible* and *desirable*. Ask them to brainstorm ideas on their big sheet of paper as to what they and their community could do now to help ensure that the future in question happens. Next, ask them to choose one scenario, which they all agree, is *probable* but *undesirable*. Have them brainstorm ideas about what they and their community could do now to help prevent the future in question from happening. (20 minutes)

Step 4: Hold a whole-class discussion, first asking for reports, group by group, on the likelihood and desirability of each scenario. Ask others to comment on what the reporting group says. Do they agree? Disagree? Why? Then, go round each group again and have them report on the ideas they have brainstormed for helping a

desired future happen and for preventing an undesired future from happening. Again, encourage others to comment on the proposals of each group. (25 minutes)

Extensions

1. Have students go out into the community, asking them to continue working in their original pairs and interview two people from the community about the likelihood and desirability of each scenario. Back at school, have pairs report back on the range of answers they received and use reports to stimulate class discussion.
2. Have students write a short reflective essay focusing on possible and desired futures and how to achieve them.

Potential/Facilitation Tips

There are both positive (more resilient) and negative (more vulnerable) scenarios for the future. What we do now can help the positive happen (building resilience) and stop the negative from materializing (reducing vulnerability). During *Step 4*, help students to develop ideas for practical steps to increase resilience and reduce vulnerability. This activity also helps students refine their ability to discuss, explain their views, evaluate and critique the opinions of others.

In preparation for facilitating this activity, reread *Case Study 1, Climate Change Impacts in SVG*, in the *Resource Manual*.

Curriculum Links

This activity complements the Form 3 Integrated Science and Technology Earth Science strand in which climate change figures significantly. Achievement indicators under the 'Earth's Weather and Climate' theme require students to 'discuss the concept of climate change' and 'describe the effects of climate change on the human and natural environments' while indicators under the 'Earth's Resources' theme call on students to 'describe the adverse effects of man's activities on the environment' and to 'discuss the measures that can be taken to reduce/eliminate these adverse effects.' Additionally, the 'Places' theme in Form 3 Social Sciences syllabus has the following achievement indicators: 'examine the role human activities play in climate change;' 'examine the impact of global warming as a climatic phenomenon.'

Handout: SVG Climate Change and Disaster Risk Future Scenarios

1. SVG joins other Caribbean governments in jointly making climate change mitigation a policy priority, even though the region is not a big emitter of greenhouse gases. They dramatically reduce their dependence on fossil fuels by developing efficient, renewable energy sources that are much more sustainable. Areas filled with solar panels are everywhere to be seen on SVG!

POSSIBLE PROBABLE IMPROBABLE IMPOSSIBLE DESIRED UNDESIRED

2. Sea level rise drives tens of thousands of coastal dwellers from their homes. Many Caribbean citizens become 'climate refugees' and move to other countries where they are safer. In SVG, long-standing residents situated in the hills distant from the coast do not always welcome the influx of coastal refugees into their communities.

POSSIBLE PROBABLE IMPROBABLE IMPOSSIBLE DESIRED UNDESIRED

3. Extreme weather events and unpredictable patterns of rainfall increase the frequency of crop failure on SVG with banana and plantain production especially badly hit. Bouts of flooding and high winds damage farms and crops. Access roads to farms are often washed away. Extended droughts seriously affect farms given their very heavy reliance on assured rainfall. A pillar of the SVG economy, the farming sector, is increasingly under threat.

POSSIBLE PROBABLE IMPROBABLE IMPOSSIBLE DESIRED UNDESIRED

4. A body of scientists from across the Caribbean region work together to develop drought tolerant varieties of agricultural products such as dasheens (taro) and sweet potatoes. Food production and supply on SVG flourish in spite of the changing, increasingly dry, climate.

POSSIBLE PROBABLE IMPROBABLE IMPOSSIBLE DESIRED UNDESIRED

5. Because so much greenhouse gas comes from methane released by cows and because beef production gives such poor food yields compared to the growing of crops, a majority of Vincentians is persuaded to turn way from meat eating and become vegetarian or vegan.

POSSIBLE PROBABLE IMPROBABLE IMPOSSIBLE DESIRED UNDESIRED

6. Across SVG children and youth become spokespersons and leaders in community projects for resilience building in the face of climate change and natural disasters, thanks to the new knowledge and skills they have acquired at school. Youth leadership becomes key to a resilient future SVG!

POSSIBLE PROBABLE IMPROBABLE IMPOSSIBLE DESIRED UNDESIRED

7. Thanks to a binding international agreement to protect coral reefs, the Mesoamerican coral reef, known as the jewel of the Caribbean, once predicted to collapse by 2050, has recovered largely through scientist-supported community action. Fishing boats only fish in designated areas. Responsible eco-tourism is the order of the day on the reefs. Local people replant corals that were dying off. Coastal communities whose livelihood was threatened are thriving again.

POSSIBLE PROBABLE IMPROBABLE IMPOSSIBLE DESIRED UNDESIRED

8. In an effort to end fossil fuel dependency, the SVG government closes many beaches to make way for land links to offshore wave and wind power facilities. The green energy industry based on wind, solar, wave and hydropower becomes a dominant contributor to the national economy while the tourism industry falls away.

POSSIBLE PROBABLE IMPROBABLE IMPOSSIBLE DESIRED UNDESIRED

9. Rising sea levels and inland flooding cause damage to airports, power plants, roads and low-lying areas on SVG, as well as to prime tourist locations on many islands with big losses in revenue. Marinas, resorts and hotels struggle to survive and workers in the tourism industry – guides, taxi drivers, tour operators - find life hard going.

POSSIBLE PROBABLE IMPROBABLE IMPOSSIBLE DESIRED UNDESIRED

10. People in SVG practice good water management by building more water tanks and wells to combat the increasing dryness of the climate. They also protect water catchment areas better and build irrigation systems to avoid being short of fresh water and sufficient food.

POSSIBLE PROBABLE IMPROBABLE IMPOSSIBLE DESIRED UNDESIRED

11. Climate breakdown becomes so acute that ways have to be found to stop greenhouse gas release through the production and driving of cars. So the SVG government responds positively to the international call for a ban on private cars, replacing the private car with an electric bus system for getting round St Vincent and the Grenadines and an electric truck system for delivering goods.

POSSIBLE PROBABLE IMPROBABLE IMPOSSIBLE DESIRED UNDESIRED

12. The government passes laws protecting forests and nature reserves, gives incentives for community restoration of mangroves, and considerably increases the number of legally protected species. Communities are encouraged and incentivized to become ‘champions of nature’. In this way deforestation and biodiversity loss slow to a halt on SVG.

POSSIBLE PROBABLE IMPROBABLE IMPOSSIBLE DESIRED UNDESIRED

Strand 2: Climate Change
Unit 2: Climate Changed Futures
Topic 3: Youth Action for Climate Change Justice

Activity 6: Climate Change Action

Purpose: Considering the acceptability and effectiveness of various forms of social action in response to climate change

Time needed: 50 minutes

Resources needed

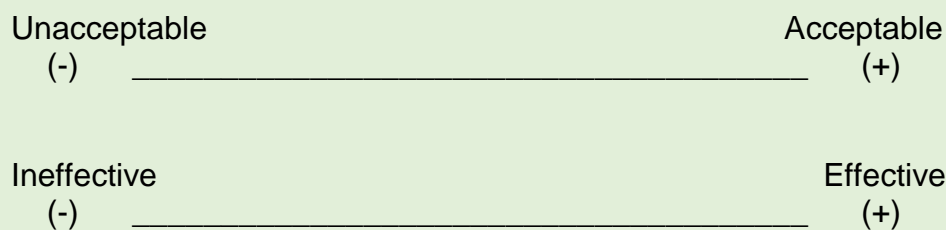
- A set of *Climate Change Action* cards per group of three students
- A sheet of chart paper and a marker per group
- Glue sticks for groups to share
- Internet access for some of the *Extensions*

Procedure

Stage 1

Step 1: Have students form groups of three. Distribute the sets of statements, chart paper and markers. Give half the groups the criteria Acceptable/ Unacceptable and the other half the criteria Effective/Ineffective. On the top half of their chart paper, groups copy one of the diagrams (see *Box 4*).

Box 4



Have students quietly read the twelve action statements and decide where they stand regarding the criteria they are using. Then have groups negotiate a placing of each statement along a continuum between their two criteria. So, for instance, the statement describing an action felt to be the most unacceptable goes closest to the (-) sign and the statement describing an action that is deemed to be most acceptable goes closest to the (+) sign. Statements describing actions considered falling somewhere in between are placed at an agreed point along the continuum. The placing complete and statements stuck down have each student draw and initial where they would draw the line between what they think are acceptable and unacceptable (or effective and ineffective) actions. (25 minutes)

Step 2: Have each group join with another that has used different criteria for each to share and explain their decisions. (10 minutes)

Step 3: Hold a whole-class discussion to air issues raised and insights gained. (15 minutes)

Extensions

1. Have the class debate, discuss and agree upon three actions that the class as a whole might take to address the issue of climate change. Have them agree upon dates for accomplishing specific targets and monitoring progress, and review what has been achieved over the following three-month period.
2. Have the class research the citizenship action approaches of the global youth movement, Extinction Rebellion, and discuss its tactics and strategies for combatting climate change in the light of the activity just done. For the Extinction Rebellion website, direct students to: www.Rebellion.earth Direct their attention specifically to the organization's *Declaration of Rebellion*. See: https://rebellion.earth/declaration/?gclid=EAIaIQobChMI6ouZstvc5AIVhrHtCh07VACfEAAYASABEqJKkPD_BwE Have students read the *Declaration* and hold a class discussion during the next class.
3. Have the students find out about the Caribbean Youth Environment Network (CYEN) through a homework Internet search and, at the next class, have the students analyse the youth action approaches it uses and also approaches it avoids. Direct the class to the following web link: <http://www.climatenetwork.org/profile/member/caribbean-youth-environment-network-cyen>
4. Have the class watch 15-year old Greta Thunberg's address to the UN Climate Change Conference in December 2018. Then have each class member work quietly on their own as they write down reactions to what they hear. Then have the class form groups to share responses. Follow this with a whole class debriefing. For the speech (3.29 minutes), go to: <https://www.youtube.com/watch?v=VFkQSGyeCWg> If Internet access is not available, the transcript of the speech is available within *Case Study 21* of the *Resource Manual*.

Variations

- Conduct the exercise twice, focussing on acceptability in the first round and effectiveness in the second round. If this approach is used, have students work alone on determining their continuum before joining into groups to share, explain and discuss their decisions. This has resource implications in that all students will need a set of statements, a sheet of chart paper, a marker and access to a glue stick for the initial individual work.
- Use a third continuum – responsible/irresponsible – and have groups work on all three continua.

Potential/Facilitation Tips

This activity is designed to alert students to the need to make mature and informed choices about their involvement in climate change social action and other actions for social change. In the concluding general discussion, the following questions might be asked:

- Were there significant disagreements in the original groups over placing the statements and where the line would be crossed? What were the disagreements about?
- What difficulties and disagreements emerged over the placing of statements and where the line was crossed when combined groups interfaced with their decisions? Were some actions judged acceptable but ineffective? Were some actions judged effective but unacceptable? How much consensus proved possible in the original groups and joined groups? If there was little consensus, what was the problem? Did members rethink their initial positions once they encountered those who had worked with different criteria?
- Might the line be drawn/crossed differently if more detail of particular cases had been provided? Is the 'devil in the detail'?
- Might people of different age groups, cultures, or countries draw the line elsewhere than the class groups?
- Were there differences of opinion between genders in groups? Might gender be a significant factor in decisions made?

In preparation for facilitating this activity, reread *Case Study 21, Youth Action for Climate Change and the Environment*, in the *Resource Manual*.

Curriculum Links

This climate change dimension of this activity complements the Form 3 Integrated Science and Technology Earth Science strand in which climate change figures significantly. Achievement indicators under the 'Earth's Weather and Climate' theme require students to 'discuss the concept of climate change' and 'describe the effects of climate change on the human and natural environments' while indicators under the 'Earth's Resources' theme call on students to 'describe the adverse effects of man's activities on the environment' and to 'discuss the measures that can be taken to reduce/eliminate these adverse effects'. It also complements the 'Places' theme in Form 3 Social Sciences syllabus, which includes the following achievement indicators: 'examine the role human activities play in climate change;' 'examine the impact of global warming as a climatic phenomenon.' The citizenship action dimension of the activity generally accords with the Form 3 'Social Responsibility' theme of the Social Sciences curriculum with its emphasis on 'factors which impact on the social environment'.

Climate Change Actions Cards

Sit Down Young people sit down and block an oil processing plant entrance and paint slogans on the walls because the plant is a major greenhouse gas producer.	Family Change A teenager gets her parents and sisters to cut down on what they buy and consume for the good of the planet, cutting out foods that in their production and transportation add to climate change
Social Media Young people of the developing world use social media campaigns to make young people in economically rich countries aware of how their nations are most responsible for most greenhouse gas emissions, for which they should pay compensation.	Demonstration Young people are invited to join and help organize a demonstration and march that closes Kingstown city center to protest against the failure of a recent international climate change conference.
Tree Planting Supervised by adults, young people plant trees on slopes above their village to stop mud landslides caused by occasional freak weather conditions.	Letters A school course on climate change ends with the teacher and students deciding to write letters to politicians and media expressing their concerns about climate change and demanding more government action.
Boycott Inspired by a local speaker, young people join a campaign of posters, meetings and picketing shops to encourage people to boycott meat in that the beef industry is a major cause of global warming.	World Conference A small party of local young people from St Vincent and the Grenadines is invited to travel to a major international climate change conference to speak about the problem as they see it; there is a photo opportunity for the party to stand with world leaders.

Sit Down Protest

To help stop the cutting down of rainforests, young people are put on the front line of a non-governmental organizations' sit-down protest to stop logging trucks getting into the forests when a television crew visits.

Picketing

Holding placards and engaging those who pass by, students mount their weeklong vigil outside the offices of a big business corporation that has a bad environmental record and that is using its wealth to weaken international efforts to limit climate change.

Risk Reduction Campaign

Local environmentalists involve young people in helping with an awareness-raising campaign on the need to prevent flooding because local leaders seem blind to the danger.

Save Water

Young people use their muscles and energy to help an international non-governmental organization erect water-saving tanks in various places across the SVG community.

Strand 3: Climatological Hazards
Unit 3: Drought
Topic 1: Drought Causes and Effects

Activity 7: When the Rain Fails to Fall: Understanding Drought

Purpose: Defining drought; examining causes and effects of drought

Time needed: 60 minutes plus a varying amount of time for homework

Resources needed

- A *Drought Interview Questions* handout per student
- Sheets of chart paper and markers per group

Procedure

Step 1: As homework, have each student ask three adults about drought using the *Drought Interview Questions* handout and fill in the form. (Varying amount of time)

Step 2: Ask students to form groups of five. Give a sheet of chart paper and markers. Have them share the answers to the first two questions (How would you describe drought?; Have you experienced drought?). Then ask them to come up with a group definition of drought. Remind them that they can inject their understanding into the definition. Once agreed, have them write up the group definition of drought. (10 minutes)

Step 3: In the whole class session, invite each group to share their definitions and hold a general discussion on a drought. Draw upon the information in *Box 5*. In facilitating the discussion, reminding the class of the notion of slow-onset disaster as considered in Form 2. Ask volunteers from the students to share the drought experience examples they have gathered. (20 minutes)

Box 5: What is Drought?

Drought originates from a deficiency of precipitation over an extended period of time, usually a season or more. This deficiency results in a water shortage for some activity, group, or environmental sector. It is different from other hazards in that it develops slowly, sometimes over years. Drought can be devastating: water supplies dry up, crops fail to grow, animals die and malnutrition and ill health become widespread.

Source: Taken from <http://www.preventionweb.net/english/hazards/drought/>

Step 4: Back in the same small groups, ask students to share answers to the third question (What do you think are the main causes of drought in SVG?). Have each group go through all the answers and reflect on patterns/trends in the answers. Then categorize and quantify the answers to report back the most common answer, the

next most common answer, the third most common answer until they complete all. Have them also write down key points discussed. (10 minutes)

Step 5: invite each group to share what they have discussed as a stimulus in a whole-class discussion. At appropriate points, draw upon *Box 6* in guiding the discussion. (20 minutes)

Box 6: What Are the Causes of Drought?

- Changing weather patterns manifested through the excessive build up of heat on the earth's surface
- Meteorological changes that result in a reduction of rainfall
- Reduced cloud cover that results in greater evaporation rates
- Inadequate planning
- Over-grazing and poor cropping methods that result in reduced water-retention capacity of the soil
- Improper soil conservation techniques that lead to soil degradation. Densely populated lands

Source: Taken from

<http://www.odpem.org.jm/DisastersDoHappen/TypesofHazardsDisasters/Droughts/LearnMoreAboutDrought/tabid/286/Default.aspx>

Extension

Have students share what they have learned with the people they interviewed.

Potential/Facilitation Tips

During the initial brainstorming exercise (*Step 2*), encourage students to share their understanding of drought and actual examples of the impacts of drought they have experienced personally. Also, have students think of how different effects of drought can be mutually reinforcing, drawing upon the drought examples they have gathered.

During the first whole-class discussion (*Step 3*), write down drought experience examples. Then ask which effects are 'economic,' 'environmental' and 'social' (or primarily so). Underline in different colour chalks. Briefly explain that drought is a slow onset hazard and that evolves over months or even years. It may affect a large region. Also, explain that the impacts of drought can be reduced through preparedness and mitigation measures (see *Activity 9*).

During the second whole class discussion focusing on causes of drought (*Step 5*), write down key categories on the blackboard. Then ask which causes are 'natural' causes and 'human-induced' causes. Again, underline in different colour chalks.

In preparation for facilitating this activity, reread *Case Study 5, The Long Drought 2009-2011*, in the *Resource Manual*.

Curriculum Links

This activity aligns with the 'Disaster Preparedness' learning outcome in the Form 3 Health and Family Life Education curriculum, which indicates that students 'examine disaster preparation strategies for SVG'.

Handout: Drought Interview Questions

Ask the following questions and write summaries of each answer.

Q1: How would you describe drought?

Q2: Have you personally experienced drought? If so, please give me some details.

Q3: What do you think are the main causes of drought in SVG?

	Q1	Q 2	Q 3
Interviewee 1			
Interviewee 2			
Interviewee 3			

Strand 3: Climatological Hazards

Unit 3: Drought

Topic 2: Human Impact Stories

Activity 8: Living With Drought

Purpose: Exploring differentiated impacts of drought; considering factors that make some people more vulnerable to drought

Time needed: 60 minutes

Resources needed

- Student's notebook

Procedure

Step 1: Divide students into five groups and give one of the following roles to each group:

- A single mother with small children
- A hotel manager
- An elderly couple with poor health
- A small farmer
- A low-income family

Explain that you are going to read a drought scenario and their task is to write an imaginary story capturing the experiences and feelings of the person they represent.

Readout slowly and with expression the scenario in *Box 7*

Box 7

You live on Union Island. The island has little surface water and groundwater. Rainfalls are intense but less frequent and residents depend on rainwater harvesting systems to supply enough fresh water for drier months.

This year, you are experiencing prolonged periods of drought. Those who cannot afford their water tank have to go to the government cisterns to fill up water containers. While water from the government cisterns is free, the transport costs are not. As only a limited amount of water can be transported at a time, many trips to the cisterns are required per week to obtain a sufficient amount of water for daily use.

Without discussing with others, ask each student to write a few paragraphs describing the life of the person they represent using the 'I' form. Have them imagine how the person's typical day looks like, how the person manages his/her life, how

they feel about the situation and what help and support s/he would like to have. (15 minutes)

Step 2: Once completed, ask students to share their stories within the group. Then ask them to compose one coherent story by incorporating the different pieces written by different team members. (15 minutes)

Step 3: Invite each group to read out their synthesized story. Hold a class discussion focusing on similarities and differences in their perspectives, feelings and experiences. Discuss what makes some people more vulnerable to drought. In facilitating the discussion, draw upon the information in *Box 8* as appropriate. (30 minutes)

Box 8

- Farmers, particularly small farmers with limited resources, are vulnerable. Their livelihood is threatened by low rainfall where cropping is rain fed, and also by low water levels and increased production costs due to increased irrigation use. Even a dry spell of 7-10 days can result in a reduction of yield, which negatively affects their income.
- Tourism, the most vital economic sector, is the water intensive industry and therefore vulnerable to drought. Both the low quality and low quantity of water could heavily impact the tourism sector during drought.
- Those who cannot afford water tanks, have to spend a lot of their income on transportation of water to their homes, which means that they face hard economic choice and limitations.
- People with low personal mobility or living in areas with lower accessibility of services tend to have less ability to respond to drought as it may take them longer to help themselves or to seek and receive help from others.
- People with existing health problems have diminished ability to take action due to physical constraints.

Sources: Caribbean Institute for Meteorology and Hydrology & FAO. 2016. *Drought Characteristics and Management in the Caribbean*; Our Place on Earth. *Case Study. Community Capacity: Enabling Local Leaders. An Exploration of Community-based Climate Action. St Vincent and the Grenadines.* Climate Just. <https://www.climatejust.org.uk/socially-vulnerable-groups-sensitive-climate-impacts>

Potential/Facilitation Tips

This activity helps students develop empathetic feelings towards those impacted by drought by putting themselves in their shoes. Writing a story using the 'I' form is helpful in this regard.

It is important to point out that a 'one size fits all' approach (e.g., collecting water from the government cisterns in this scenario) has its limitation. Discuss what help and support would be necessary to make freshwater accessible to all citizens in a time of drought. What drought preparedness and mitigation measures should be in place before droughts occur?

Curriculum Links

This activity aligns with the 'Disaster Preparedness' learning outcome in the Form 3 Health and Family Life Education curriculum, which indicates that students 'examine disaster preparation strategies for SVG'. This is also suitable for Learning Outcome 2, Achievement Indicator 2 in Form 3 English curriculum, which creates different kinds of text that can include fictional text on climate change.

Strand 3: Climatological Hazards
Unit 3: Drought
Topic 3: Drought Mitigation Local Action

Activity 9: Drought Preparedness and Mitigation Local Action

Purpose: Analyzing drought mitigation local action examples

Time needed: 65 minutes

Resources needed

- *A video clip of Water Tank Project for Union Islands 2016-2017*
<https://www.youtube.com/watch?v=zcjhLIG8mCE&feature=youtu.be> (8:22 minutes)
- *A Building a Carbon Neutral Reverse Osmosis Desalination Plant, Bequia* handout per group

Procedure

Step 1: Tell the class that they will examine two drought mitigation local action examples. Have the class form groups of three or four. Explain that they will watch the first example, *Water Tank Project for Union Islands* and while watching it, they should consider the following questions: (1) In what ways was the project effective in reducing vulnerabilities to drought?; (2) What social, economic and/or environmental benefits has the project brought?; (3) What are unique ingredients in the project approach that have made for success; (4) Might this project be replicated in other parts of SVG? Write those questions on the board as a reminder. Show the video clip and have each group discuss the questions. (15 minutes)

Step 2: Have groups report back and lead a short discussion around what is reported. (10 minutes)

Step 3: Distribute copies of the *Building a Carbon Neutral Reverse Osmosis Desalination Plant, Bequia* handout to groups. Have groups read it through and discuss the same questions as used in *Step 1*. (15 minutes)

Step 4: Have groups report back and lead a short discussion around what is reported. (10 minutes)

Step 5: Using the information in *Box 9*, explain that there are other drought preparation and mitigation approaches in addition to rainwater harvesting and building a desalination plant. Describe them. Have a final class discussion. (15 minutes)

Box 9

- ***Water Conservation:*** Water conservation is the simplest and most useful prevention and mitigation measure by preventing waste of water and

encouraging recycling of water

- **Vegetation Cover:** Environmental improvements help to restore ecology in the region. Vegetation cover helps rainwater to seep underground. This would raise the level of the water table and over time precipitation is also increased due to the vegetation cover.
- **Water Storage:** A long-term defense against drought is construction of dams and reservoirs for artificial storage of water. The water is then supplied to the water supply source through storage reservoirs. Water is stored in the reservoirs during high rainfall time and then used during the lean rainfall period. Village ponds and tanks are also good strategies to combat the effects of droughts.
- **Watershed Management:** The land area that sheds water into a particular river is called its watershed. The surface runoff from this area ultimately finds its way to the river. When the watershed of the river is heavily forested, the surface runoff becomes less. Roots of the trees and littered leaves on the ground help in absorbing water.
- **Crop Diversification:** Diversification and adjustment of cropping patterns are ways to reduce agricultural losses due to inadequate rainfall, such as the introduction of drought resistant crop.

Extension

Have each group choose one of the drought preparedness and mitigation measures explained in *Step 5 (Box 9)* and have them gather some good practice on the selected measures from SVG or the wider Caribbean region and prepare a brief presentation (3 minutes) to the whole class. Ask them to describe the examples and explain why the chosen examples are, indeed, 'good' practice. Hold a student presentation session and encourage questions and answers after each presentation.

Potential/Facilitation Tips

Students will learn about two good local action examples from the Grenadines of tackling drought vulnerabilities. Students in St Vincent should be encouraged to consider the applicability of the two examples in St Vincent context.

During the final whole-class discussion (*Step 5*) indicate that climate models suggest that SVG will experience more dry periods and further reductions in rainfall in the future. There may also be an increase in rainfall intensity on the fewer rain days. Thus, it is likely that the country will be vulnerable to both droughts and torrential rains, with secondary effects such as landslides and the contamination of water supplies. Have students reflect on what 'good' drought preparedness and mitigation measures might mean in this context.

In preparation for facilitating this activity, read *Case Study 5, The Long Drought 2009-2011*, in the *Resource Manual*.

Curriculum Links

This activity aligns with the 'Disaster Preparedness' learning outcome in the Form 3 Health and Family Life Education curriculum, which includes an indicator that students 'examine disaster preparation strategies for SVG'.

Handout: Building a Carbon Neutral Reverse Osmosis Desalination Plant, Bequia

Bequia is the second-largest of the Grenadine islands, approximately 7 square miles in size, with a population of 4,874 (1991 census). Due to its size and geology, the island has no surface water and no known underground source. Approximately 30% of the island is covered with scrub vegetation of no considerable significance. The livelihood of the people of Bequia is tied to the surrounding coastal sea. Most natives are fisherfolk or sailors. Given the absence of surface water and the calciferous nature of the soil, freshwater resource is a significant issue for Bequia.

The Special Program for Adaptation to Climate Change pilot project '*Implementation of adaptation measures to address the absence of fresh water and coastal vulnerabilities in Bequia, St Vincent and the Grenadines*' was implemented by the World Bank, acting as the implementing agency for the Global Environment Fund (GEF), and the Caribbean Community Climate Change Centre (CCCCC), acting as the executing agency. The project targeted the Paget Farms community, where the least wealthy population on the island lives. The community relies exclusively on rainwater harvesting as the source of domestic potable water and is therefore very vulnerable to drought.

The desalination plant was built to specifications to supply water for about 1,000 inhabitants, the projected population of Paget Farms by 2018 while working at approximately 65% of its total capacity. The water distribution system includes a permeate tank (exiting and purifying water from the pump to a tank) of 16,000 liters capacity, installed immediately after the desalination plant, plus a water storage and distribution tank of 90,000 liters capacity.



External and Internal View of the Desalination Plant, Bequia

A renewable energy (photovoltaic) system was installed on the hangar's roof at the Bequia Airport and connected to the national VINLEC (St Vincent Electricity Services Limited) grid, monitored via an installed meter. A power purchase agreement will be reached with VINLEC so that all energy required for the desalination plant operation will be guaranteed. The surplus electrical energy will be transmitted to the island's grid to allow for expansion and reduce energy production, operation, and maintenance costs.



Hanger at Bequia Airport with solar panels installed on the roof

The approximately one thousand residents of the Paget Farms community who

previously depended on an unreliable water supply derived from rainwater harvesting are the immediate beneficiaries of this pilot project. The renewable energy supply installed to provide electricity for the operation of the plant guarantees a clean and environmentally safe source of power, but also generates a surplus that allows expanded provision of services to this and neighboring communities. Revenue can be generated through bottled water sales (from the plant). This opportunity exists because Bequia is a sailboat tourist destination, and this plant allows for a local water supply that could replace supplies previously imported from Kingstown.

Sources: *Implementation of Adaptation Measures to Address the Absence of Fresh Water and Coastal Vulnerabilities in Bequia, St. Vincent and the Grenadines.*

<https://www.weadapt.org/knowledge-base/ecosystem-based-adaptation/implementation-of-adaptation-measures-to-address-the-absence-of-fresh-water-and-coastal-vulnerabilities-in-bequia-st-vincent-and-the-grenadines>:

Special Programme for Adaptation to Climate Change (SPACC) Implementation of Adaptation Measures in Coastal Zones.

<https://www.weadapt.org/sites/weadapt.org/files/legacy-new/knowledge-base/files/546a294754b8b5466372719356implementation-of-adaptation-measures-to-address-the-absence-of-fresh-water-and-coastal-vulnerabilit-id-4790-.pdf>

Strand 4: Geological Hazards
Unit 4: Landslides & Tsunamis
Topic 1: Tsunami Threats to SVG

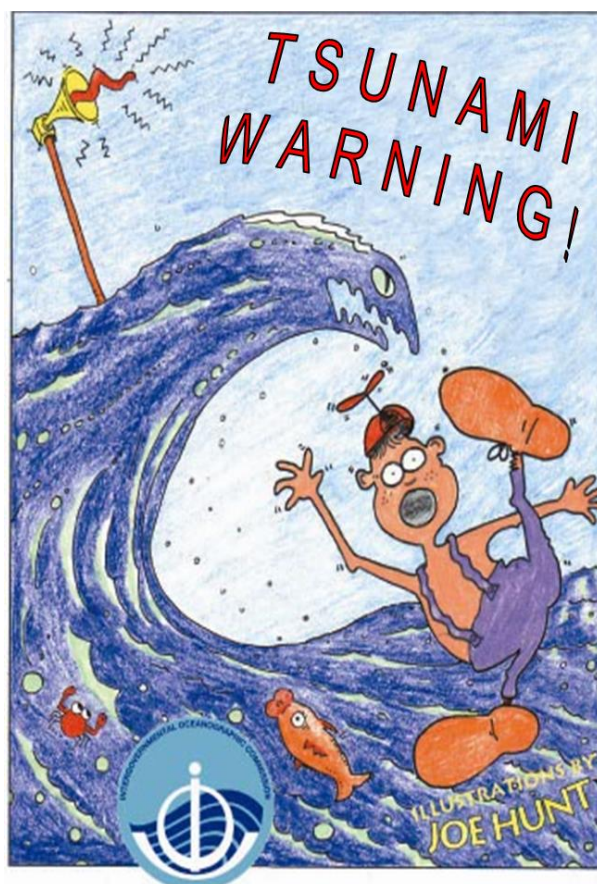
Activity 10: Tsunami Warning!

Purpose: Understanding the mechanisms of local and distant tsunamis, how tsunami alerts and warnings work and the public warned, and what the public should do before, during and after a tsunami hits the SVG coast

Time needed: 70 minutes

Resources needed

- A school set of the SVG version of the *Tsunami Warning! Caribbean* cartoon booklet available from NEMO so there is a copy per student or pair of students.
- A cleared floor space or tabletop space with a large rectangular chart made up of four quadrants labeled: *Why and How Tsunamis Happen; How a Tsunami Alert/Warning Works, What to do before a Tsunami Arrives; Staying Safe when a Tsunami Strikes*
- A few markers



Procedure

Step 1: Ask the class what they *know* about tsunamis, summarizing what is shared on one half of the board. Then ask the class what more they *would like to know*, summarizing suggestions on the second half of the board. (10 minutes)

Step 2: Say that the class will read the cartoon booklet together and consider how it *extends their knowledge* of tsunamis and how it *revises their prior understanding* of tsunamis (i.e., corrects any misapprehensions they have). They will do this by reading sections of the booklet and then listing what they have learnt under each of the four-quadrant headings. (5 minutes)

Step 3: With the class, read the first six pages of the cartoon booklet. Then ask the class to offer ideas and suggestions concerning what, if anything, should be written in each of the four quadrants. Write these on the chart. (10 minutes)

Step 4: With the class, read the next eight pages (pp.7-14) and write in new items suggested by the class in any of the four quadrants. (15 minutes).

Step 5: Now read the final 14 pages (pp. 15-28) of the cartoon booklet that focus on the tsunami reaching SVG. Again, write in new learning points volunteered by students in any of the four quadrants. (20 minutes)

Step 6: Finally, return to the lists on the board and have the class consider, first, whether their knowledge of tsunamis has been extended and in what ways, and, second, whether their calls for more knowledge have been satisfied. (10 minutes).

Extension

If there are points and issues that the students wanted to know more about that, have not been answered, have them send an email or otherwise contact NEMO for further input and information.

Potential/Facilitation Tips

This activity systematically covers basic tsunami and tsunami safety knowledge using an easily digestible, student-friendly resource. It is a good idea to briefly return to the two lists on the board created in *Step 1* after *Steps 3, 4* and *5* before fuller consideration under *Step 6*.

In preparation for facilitating this activity, reread *Case Study 9, Tsunami Threat*, in the *Resource Manual* and add information given in the case study to classroom discussions. Share the artist's image of a Caribbean tsunami that opens the case study with the class to sobering effect.

Curriculum Links

This activity aligns with the Form 3 Health and Family Life Education syllabus where the 'Disaster Preparedness' learning outcome requires students to 'assume a responsible attitude towards disaster preparedness,' two indicators for which are 'examine disaster preparation strategies for SVG' and 'demonstrate the ability to

respond appropriately at different stages of a disaster.’ The reading of the booklet helps meet the reading achievement indicators of Form 3 English curriculum.

Strand 4: Geological Hazards
Unit 4: Landslides & Tsunamis
Topic 2: Tsunami Safety Measures and Practice

Activity 11: Tsunami Safety Measures

Purpose: Learning how to be prepared for a tsunami and what to do if a tsunami threatens

Time needed: 60 minutes (*Stage 1*, 20 minutes; *Stage 2*, 40 minutes)

Resources needed

- One cut-up set of *Tsunami: Be Prepared!* cards
- Chart paper, markers and crayons for each of the four groups that will be formed

Procedure

Stage 1

Step 1: Have the class stand in a circle and hand a different '*Tsunami: Be Prepared!*' card to each student. Explain that each card gives a particular piece of advice about staying safe from a tsunami. Explain, too, that there are four kinds of advice on the cards: some cards advise on things to be aware of ahead of time in preparation for a possible tsunami happening; some cards give guidance on signs to look out for that suggest that a tsunami might be imminent (i.e., about to happen); some cards advise on tsunami 'dos' (i.e., things to do if a tsunami is coming); and, some advise on tsunami 'don'ts' (i.e., things to not do if a tsunami is coming). Then invite students to move around the room, share and discuss cards and get into 'Preparation,' 'Warning Signs,' 'Do's,' and 'Don'ts' groups. When class members are all in groups, encourage each group to check that everybody looks to be correctly placed. (10 minutes)

Step 2: That done, have groups read out their cards to the whole class, beginning with the 'Preparation' group and ending with the 'Don'ts' group (it may emerge that some students are not in the right group and need to move!). Then trigger a discussion by asking students what they learned about key things to avoid tsunami danger. (10 minutes)

Stage 2

Step 1: Have each of the four groups brought together in *Stage 1* use their pooled collection of cards to design a set of posters capturing the key messages of their card set. (25 minutes)

Step 2: Have groups present their poster set to the whole class, encouraging the class to comment on each group's work. (15 minutes)

Extensions

1. Have the 'Preparation,' 'Warning Signs,' 'Do's,' and 'Don'ts' groups each make cloth puppets and prepare a puppet show that includes story and song capturing the messages on their cards. Arrange for them to perform to younger children and, maybe, the rest of the school.
2. Have the 'Preparation,' 'Warning Signs,' 'Do's' and 'Don'ts' groups prepare small dramas based on the messages on their cards that they perform to younger children and/or to the rest of the school to the community.
3. Have the 'Preparation,' 'Warning Signs,' 'Do's' and 'Don'ts' groups each prepare rhythmic and melodic pieces based on the messages on their cards that they perform using different musical styles (reggae, Calypso, R&B) to younger children and/or to the rest of the school and the community.
4. Display the complete poster collection in the classroom and/or in a prominent place in the school.

Potential/Facilitation Tips

This activity is designed to alert students to tsunami preparedness measures and actions to take before and when a tsunami makes landfall. Its extension sections give students opportunities to pass on their learning to their peers, younger students, and the community. You need to be aware that the topic can be terrifying and that the overarching message has to be that the tsunami threat is diminished if people are prepared and alert. Students passing on their learning to younger students need to be aware that their task is to reassure, not frighten.

In preparation for facilitating this activity, reread *Case Study 9, Tsunami Threat*, in the *Resource Manual* and add information given in the case study to classroom conversations.

Curriculum Links

This activity aligns with the Form 3 Health and Family Life Education syllabus where the 'Disaster Preparedness' learning outcome requires students to 'assume a responsible attitude towards disaster preparedness,' two indicators for which are 'examine disaster preparation strategies for SVG' and 'demonstrate the ability to respond appropriately at different stages of a disaster.' The *Extensions* fit nicely into work to be done in the Music, Visual Arts and Drama sections of the Creative Arts curriculum.

Source: Adapted from Selby & Kagawa (2014). Disaster Risk Reduction Education Toolkit. (St Michael: CDEMA).

Handout: Tsunami: Be Prepared! Card

<p>Never go to the beach or seashore to watch a tsunami.</p>	<p>If you are at the coast and feel an intense shaking run inland or to high ground as soon as the shaking stops as the earthquake may cause a tsunami.</p>
<p>Remember that tsunamis have occurred in the Caribbean in the past to devastating effect and with huge loss of life</p>	<p>Be clear about whether or not you live in a designated tsunami evacuation zone.</p>
<p>Always share and discuss what you learn about tsunamis with family, friends and others in the community.</p>	<p>Never stay in low-lying areas by the sea after a strong earthquake</p>
<p>Study, research and learn all you can learn about tsunamis</p>	<p>Abandon belongings – focus on saving your life as the tsunami approaches</p>
<p>An unusual roar from the sea after a long and big earthquake may mean a tsunami is approaching. Run inland and to higher ground!</p>	<p>If you live, go to school, or work in a low-lying area near the coast, learn the quickest and most direct way to reach high ground inland (at least 30 meters above sea level and some 3 kilometers away from the coast)</p>
<p>Don't forget that a tsunami is not just one wave but comprises a series of waves and that the first is not necessarily the largest or most deadly</p>	<p>Know where the local tsunami evacuation zone is if you live by the coast and especially if you live in a low-lying coastal area</p>
<p>Stay tuned, if possible, to radio or television or log on to the SRC website (www.uwiseismic.com) to get the latest emergency information</p>	<p>Arrange for basic medical supplies to be kept at the tsunami evacuation zone</p>
<p>Climb up and cling to a strong tree if there is no time to reach the high ground or find a big building</p>	<p>Develop a family emergency plan, so you know how to contact each other if separated</p>
<p>Don't stay by rivers and streams that lead to the sea, as the tsunami will rush up them.</p>	<p>Evacuate homes by the coast immediately if there is a tsunami warning.</p>
<p>If there is no high ground, look for a strong, tall concrete building and climb to the highest floor or the roof.</p>	<p>Never go back to low-lying coastal areas or other possible danger zones until an 'all clear' is issued.</p>

<p>Act at once if you sense danger; don't wait for a tsunami warning to be put out.</p>	<p>If water on the beach is sucked out to sea, exposing the seafloor, it's a sure sign a tsunami is coming. Run inland and for higher ground!</p>
<p>Be aware that experts are saying a tsunami might hit the Caribbean islands anytime soon!</p>	<p>Treat all warnings to the public seriously and listen out for warnings.</p>
<p>If swept up by a tsunami, look for something to use as a raft</p>	<p>If your school is by the sea, do what teachers say if it is feared a tsunami is on its way</p>
<p>Practice regular tsunami evacuation drills at school and home</p>	<p>Be aware that there are three kinds of tsunamis and those triggered locally or regionally give little time for action</p>
<p>Have food and water stored at the tsunami evacuation zone</p>	<p>Have the community build enough shelter for local people at the tsunami evacuation zone</p>

Strand 4: Geological Hazards

Unit 4: Landslides & Tsunamis

Topic 3: Landslides: Human Impact Stories and Safety Steps

Activity 12: Safari and the Landslide

Purpose: Understanding the causes of landslides; understanding a range of actions to prevent landslides and reduce vulnerability to landslides.

Time needed: 60 minutes

Resources needed

- A copy of *Safari's Encounter with a Landslide* (UNISDR-Africa Drought Monitoring Centre Nairobi) downloadable from:
http://www.preventionweb.net/files/4082_safarisencounterwithlandslide.pdf

Procedure

Step 1: Explain to students that you will read the story of a boy called Safari who lives in Africa and that the story has three parts: first, it tells of a landslide incident; second, it tells of his grandfather's explanation of the causes of the landslide; third, it tells of Safari's decision to take positive actions to prevent future landslides. Say that you will stop after each section and give some instructions. Ask students to form into groups of three. (5 minutes)

Step 2: Read out the first section of the story (pages 1 to 4) and ask each group to predict what their grandfather might say about the causes of the landslide and jot down their ideas. Ask each group to share their suggestions. (15 minutes)

Step 3: Read out the second part of the story (pages 5 to 12) and ask the class how close they came to predicting what Safari's grandfather would say. Then ask each class to predict what Safari and his friends would decide to do to prevent future landslides. Ask them to write down their ideas and then invite them to share their suggestions. (15 minutes)

Step 4: Read out the last part of the story (pages 13 to 20). Ask the class to assess how close they came to predicting what Safari and his friends would do. (15 minutes)

Step 5: End with a whole group discussion focusing on what could be done to help ensure future landslides on SVG are prevented. (10 minutes)

Potential/Facilitation Tips

Read the story as vividly as possible to make it come alive. Having students anticipate subsequent parts of the story will stimulate their creative thinking and help gauge their current understanding of the causes of landslides and landslide prevention measures. In the final class discussion (*Step 5*), ask students for their opinions on whether the reasons given for landslides in the story are also true for

SVG. Ask, too, whether the landslide prevention measures suggested are relevant to SVG. Can they think of other reasons for landslides in SVG that are not mentioned in the story? Do they know of landslide prevention measures being taken in SVG that are different from the measures described in the story?

In preparation for facilitating this activity, reread *Case Study 8, Trigger Floods and Landslides in St. Vincent and the Grenadines*, in the *Resource Manual*.

Extensions

1. Have students make lists of reasons for landslides and prevention measures as suggested in the Safari story and have them enquire of adult members of the community as to whether the reasons and measures of prevention described apply to St Vincent and the Grenadines. Can adults suggest other reasons? Do they know of other prevention measures being implemented on SVG? Give space for reporting back in class.
2. Have students interview adult community members of their recollections of recent major landslide events on SVG, particularly the 2016 floods and landslides. Ask students to write up a report on what they hear and bring their reports to class to share what was said. The sharing session could be followed by a reading and discussion of *Case Study 8* in the *Resource Manual*.
3. Alternatively, invite a panel of adult community members (members of the School Disaster Management Committee or the Community Disaster Management Committee, in particular) to class to talk about and take questions on their fall 2016 landslide experiences.

Curriculum Links

This activity complements the Production theme of the Form 3 Social Sciences syllabus that calls upon students to demonstrate an understanding of the impact of land use (one achievement indicator is devoted to recognizing the importance of sustainable land use). It also complements the Disaster Preparedness learning outcome of the Form 3 Health and Family Life Education curriculum. It requires students to 'assume a responsible attitude towards disaster preparedness' (one achievement indicator being the ability to 'examine disaster prevention strategies for SVG).

Source: Adapted from Selby & Kagawa (2014). *Disaster Risk Reduction Education Toolkit*. (St Michael: CDEMA)

Strand 5: Human-Made Hazards and Epidemics

Unit 5: Epidemics

Topic 1: Epidemic Threats to SVG

Activity 13: Epidemic Threats Investigation

Purpose: Understanding the causes and symptoms of diseases presenting epidemic threats to SVG and prevention measures.

Time needed: 65 minutes

Resources needed

- An *Epidemic Threats Information* Sheet for each group of four or five students
- Paper and art materials.

Procedure

Step 1: Ask the class to stand in a circle. Choose three or four students to be 'mosquitoes' and have them stand in the centre of the circle. Ask everyone in the class to close their eyes, including the mosquitoes. Walk around the outside of the circle and tap one student on the head. Have the class open their eyes. Explain that the student who was tapped on the head is a student who has a vector-borne disease for the game. Tell the student not to reveal who they are and tell the mosquitoes that they are to randomly go up to different students forming the circle and 'bite' them by shaking their hands. As they move around, they should make a buzzing noise. If mosquito bites (by shaking hands with) the student who has a vector-borne disease, that student should squeeze the mosquito's hand and whisper 'infected.' When that mosquito then bites (by shaking hands with) other students in the circle, he or she must now infect them also by squeezing their hand and whispering 'infected.' If a different mosquito bites a newly infected student, they in turn infect them and so on so that the disease spreads both to students and mosquitoes. After a few minutes, ask the class how many students and how many mosquitoes are infected. (10 minutes)

Step 2: Ask the class what they think this game represents and discuss what an epidemic is using the information in *Box 10: What are Epidemics and Pandemics?* as necessary to widen and deepen learning. Discuss how diseases can spread, including directly from human to human, via animals or through infected food or water. Explain that vector-borne diseases, in particular, pose a threat to St. Vincent and the Grenadines. Reflecting on the game, discuss how the disease might have been contained. (5 minutes)

Box 10: What are Epidemics and Pandemics?

Epidemics and pandemics are diseases affecting or tending to affect a disproportionately large number of individuals within a population, community, or region at the same time. A pandemic covers a wider geographical area than an epidemic. An epidemic is specific to one city, region or country, while a pandemic

spreads far beyond national borders. The social disruption, economic loss, and general hardship caused by a pandemic are higher.

For human diseases, the human body is the principal living reservoir of infectious organisms. Among the diseases spread by human carriers are AIDS, typhoid fever, hepatitis, gonorrhoea, and streptococcal infections. Animal reservoirs can also spread diseases. Those diseases that are spread from wild and domestic animals to humans are called *zoonoses*. Yellow fever, spread by the *Aedes* mosquito; Lyme disease, spread by ticks; rabies, spread by bats, skunks, foxes, cats, and dogs; and bubonic plague, spread by rats, are examples of *zoonoses*. Inanimate reservoirs, such as drinking water contaminated by the faeces of humans and other animals, are a common environment for organisms causing gastrointestinal diseases.

Step 3: Ask students to form groups of four or five and give each group one of the three *Epidemic Threats Information Sheets*. Ask groups to read through the information and to make notes addressing the questions: What does the sheet say about the causes of the disease? What does the sheet say about the symptoms of the disease? What does the sheet say about preventive measures against the disease? (10 minutes)

Step 4: Have students create a poster or fact sheet setting out the main information about their disease. Ask them to consider who the poster or fact sheet is for and how they will present this information to their chosen audience. (25 minutes)

Step 5: Hold a whole group discussion by inviting groups to present their poster or fact sheet along with their findings on the causes and symptoms of the disease they have considered and preventive measures for that disease. As students listen to other groups' presentations, have them identify similarities and differences between the diseases. Is there information in other groups' presentations that helps consider their disease? (15 minutes)

Potential/Facilitation Tips

The introductory activity should help the group experience and conceptualise how an epidemic spread by mosquitoes can occur. The three diseases looked at in the lesson all differ. However, they are all spread by the *Aedes* mosquito, so many of the same actions are vital in preventing all three diseases and information relevant to one is also helpful in considering the others.

Curriculum Links

This activity falls under Form 3 Health and Family Life Education, particularly the theme of 'Health Promotion' of the 'Managing the Environment' strand of the curriculum. The achievement indicators include 'decide to reduce their exposure to environmental hazards personally.' It also complements Form 3 Integrated Sciences and Technology; in particular, the theme of 'Structure, Function and Diversity' under which the achievement indicators include 'appreciate that diseases affect the proper functioning of the system.'

Source: In parts adapted from Selby and Kagawa (2014). Disaster Risk Reduction Education Toolkit. (St Michael: CDEMA).

Epidemic Threats Information Sheet 1: Chikungunya

1. In 2014, chikungunya virus infection reached epidemic levels in SVG, with 181 confirmed cases in 2014 and 8 in 2015.
2. The chikungunya virus is transmitted to humans by infected *Aedes* mosquitoes, it is the same mosquito that spreads yellow fever, zika and dengue viruses. It primarily bites during the day, peaking during early morning and late afternoon/evening. Outbreaks usually occur in areas where mosquitoes breed. The current distribution of *Aedes aegypti* is the widest ever recorded and *Aedes* mosquitoes are present in all continents.
3. Chikungunya outbreaks occur typically in urban settings. Urbanization with resulting increased population densities, amplifies mosquito-transmitted diseases.
4. Chikungunya causes a severe fever and can involve muscle pain, headache, nausea, fatigue and rash. The joint pain is often debilitating, usually lasting a few days, but maybe extending to weeks. The disease shares some clinical signs with dengue and can be misdiagnosed in areas where dengue is common.
5. After the bite of an infected mosquito, onset of illness occurs usually between four and eight days later but can range from two to 12 days. The acute phase of chikungunya lasts for three to 10 days but convalescence can be prolonged, i.e. up to one year and more. The disease is more dangerous for older people.
6. The disease is generally not fatal and people treat the symptoms and rest. The disease is treated by: applying cold compresses to lessen the joint symptoms, resting and consuming plenty of water. All suspected cases should be kept under mosquito nets during the fever period. There is no chikungunya vaccine although some possible vaccines are being tested on human beings.
7. The symptoms of Chikungunya can be confused with many other diseases such as dengue, leptospirosis, malaria, meningitis, and rheumatic fever, leading to misdiagnosis. Laboratory diagnosis is thus critical in establishing a diagnosis and initiating specific public health initiatives.
8. Controlling the mosquito carrier is key to preventing and controlling outbreaks of the disease. Strategies to control the mosquito should address all its life stages from the egg, larva and adult. Community engagement is essential for these interventions. Strategies include: eliminating its breeding sites and eggs/larvae/pupae in standing water (e.g. cleaning roof gutters, clean-up campaigns, etc.); spraying of adult mosquitoes (in areas known to be resting sites for *Aedes* mosquitoes) and personal preventive measures such as clothing minimizing skin exposure, use of repellents, as well as window screens and air conditioning to avoid mosquito bites. The use of insecticide-treated bed nets is limited by the fact that *Aedes* mosquito bite during daytime. Countries should also consider disinfection of aircraft.

Epidemic Threats Information Sheet 2: Zika Virus

1. The first recorded outbreak of zika virus disease was reported from the Island of Yap (Federated States of Micronesia) in 2007. In March 2015, Brazil reported a large outbreak of rash illness, soon identified as zika virus infection. Outbreaks and evidence of transmission soon appeared throughout the Americas, Africa, and other regions of the world. To date, a total of 86 countries and territories have reported evidence of mosquito-transmitted zika infection. In February 2016, the first case of zika virus in SVG was confirmed; by August of that year, there were already 38 confirmed and 156 presumed cases.
2. The incubation period (the time between being getting the illness and showing symptoms) of zika virus disease is estimated to be three to 14 days.
3. The majority of people infected with zika virus do not develop symptoms. Symptoms are generally mild including fever, rash, conjunctivitis, muscle and joint pain, malaise, and headache, and usually last for two to seven days. Zika virus infection during pregnancy is serious and can cause abnormalities and complications in the developing fetus and newborn. Zika virus infection is also a trigger of Guillain-Barré syndrome, which is a muscle weakening disease lasting about six months to one year.
4. Zika virus is primarily transmitted by the bite of an infected mosquito from the *Aedes* genus. *Aedes* mosquitoes usually bite during the day, peaking during early morning and late afternoon/evening. This is the same mosquito that transmits dengue, chikungunya and yellow fever.
5. Zika virus is also transmitted from mother to fetus during pregnancy, through sexual contact, transfusion of blood and blood products, and organ transplantation.
6. There is no treatment available for zika virus infection or its associated diseases. People with symptoms should get plenty of rest, drink fluids, and treat pain and fever with common medicines. If symptoms worsen, they should seek medical care and advice. Pregnant women living in areas with zika transmission or who develop symptoms of zika virus infection should seek medical attention for laboratory testing and other clinical care. Development of a zika vaccine remains an active area of research.
7. Protection against mosquito bites during the day and early evening is a key measure to prevent zika virus infection. Special attention should be given to prevention of mosquito bites among pregnant women, women of reproductive age, and young children. Personal protection measures include wearing clothing (preferably light-coloured) that covers as much of the body as possible; using physical barriers such as window screens and closed doors and windows; and applying insect repellent to skin or clothing that contains DEET, IR3535 or icaridin according to the product label instructions. Young children and pregnant women should sleep under mosquito nets if sleeping during the day or early evening.
8. *Aedes* mosquitoes breed in small collections of water around homes, schools, and work sites. It is important to eliminate these mosquito breeding sites, including: covering water storage containers, removing standing water in flower pots, and cleaning up trash and used tires. Community initiatives are essential to support local government and public health programs to reduce mosquito breeding sites. Health authorities may also advise the use of larvicides and insecticides to reduce mosquito populations and disease spread.

Epidemic Threats Information Sheet 3: Dengue Fever

1. A total of 619 cases of dengue were reported in SVG in the period 2010-2014, with 95 in 2013 and 11 in 2014. The global incidence of dengue has grown dramatically in recent decades. About half of the world's population is now at risk. Severe dengue is a leading cause of serious illness and death among children in some Asian and Latin American countries.
2. Dengue is a mosquito-borne viral disease and is transmitted by female mosquitoes mainly of the species *Aedes aegypti*. This mosquito also transmits chikungunya, yellow fever and zika infection. Dengue is widespread throughout the tropics, with local variations in risk influenced by rainfall, temperature and unplanned rapid urbanization. After virus incubation for four to ten days, an infected mosquito is capable of transmitting the virus for the rest of its life.
3. The infection causes flu-like illness, and dengue fever is a severe, flu-like illness that affects infants, young children and adults, but seldom causes death. It should be suspected when a high fever is accompanied by: severe headache, pain behind the eyes, muscle and joint pains, nausea, vomiting, swollen glands or rash. Occasionally it develops into a potentially lethal complication called severe dengue.
4. There is no specific treatment for dengue fever. For severe dengue, medical care by physicians and nurses experienced with the effects and progression of the disease can save lives. Preventing dehydration is critical to severe dengue care.
5. Infected humans are the main carriers and multipliers of the virus, serving as a source of the virus for uninfected mosquitoes. Patients who are already infected with the dengue virus can transmit the infection (for four to five days; maximum 12) via *Aedes* mosquitoes after their first symptoms appear.
6. The *Aedes aegypti* mosquito lives in urban habitats and breeds mostly in human-made containers. It is a day-time feeder; its peak biting periods are early in the morning and in the evening before dusk. Females bite multiple people during each feeding period. *Aedes* eggs can remain dry for over a year in their breeding habitat and hatch when in contact with water.
7. There is a vaccine for dengue fever. Vaccination should be considered as part of an integrated dengue prevention and control strategy.
8. The main methods to control or prevent the transmission of dengue virus is to prevent mosquitoes from accessing egg-laying habitats; disposing of solid waste properly and removing artificial human-made habitats; covering, emptying and cleaning domestic water storage containers on a weekly basis; applying appropriate insecticides to water storage outdoor containers; using personal household protection measures, such as window screens, long-sleeved clothes, repellents, insecticide treated materials, coils and vaporizers and applying insecticides.

Sources: https://www.paho.org/salud-en-las-americanas-2017/?page_id=169
<https://www.who.int/emergencies/diseases/managing-epidemics-interactive.pdf>
<https://www.who.int/news-room/fact-sheets>
https://www.paho.org/spc-crb/index.php?option=com_docman&view=download&alias=142-epidemics-investigated&category_slug=history-of-carec-1&Itemid=490
http://www.start.org/Projects/AIACC_Project/Final%20Reports/Final%20Reports/FinalRept_AIACC_SIS06.pdf

Strand 5: Human-Made Hazards and Epidemics

Unit 5: Epidemics

Topic 2: Epidemic Prevention

Activity 14: Planning for Epidemic Prevention

Purpose: Planning a project to prevent diseases posing epidemic threats.

Time needed: 60 minutes

Resources needed

- Paper and art materials
- *Epidemic Threats Information Sheets* from the previous lesson - one per group of four or five

Procedure

Step 1: As a class, ask students to discuss their previous lesson (*Activity 13*) on epidemics. Give out the *Epidemic Threats Information Sheets* of the last lesson and encourage students to use these as needed. Ask students to brainstorm measures that can help prevent the spread of vector-borne diseases and write these up on the board or flip chart. (10 minutes)

Step 2: Have students divide into groups of four or five. These could be different groups to those formed in the previous lesson so that group members bring together their learning about the three epidemic threats. Explain that each group is to develop a concrete action/advocacy project that could help prevent dengue, zika and/or chikungunya at school or in the community. On the board or flip chart paper, write up the Action Plan Headings from Box 11 below. Have students use these headings to guide their writing out their project plan. (20 minutes)

• *Box 11: Action Plan Headings*

Project Name:

- Project Purpose: *Set out how we want to brand the project so it shows the purpose*
- Project Rationale: *Why do we want to do this project?*
- Project Objectives: *What are we doing this for?*
- Expected results of the project: *What do we want to happen when we implement the project?*
- Potential risks in implementing the project: *What could go wrong?*
- Physical location: *Where will we do it?*
- Processes of the project: *How will we do it, and what are its various stages?*
- Project Team: *Who is going to do what?*
- Project Timeframe: *When are we going to do it and by when will we finish?*
- Resources: *What do we need in order to do the project? What do we have that we can use?*

- Allies: *Who might help us in our work?*
- Budget: *How much will the project cost?*

Source: Derived from Plan International. 2010. *Child-Centred DRR Toolkit*. 105-6.

Step 3: Ask each group to share their intended project plan. Encourage others to ask questions and make critical but constructive suggestions. (30 minutes)

Extension

Have each group implement its project. To do this, you will need to clarify with groups at the beginning what time and resources will be made available to them. Encourage students to list the actions they will undertake at each period allocated to their project. Ask students to record: each step they take in implementing their project, any difficulties they run into and how they overcome those difficulties. Once the projects have been implemented, hold a whole-class discussion to reflect on project implementation experiences. Ask students to write a reflective essay on their experience of change agency and advocacy, focusing on what they have learned for future change efforts.

Potential/Facilitation Tips

Vector-borne diseases are one of the pandemics in the Caribbean, but it is essential to emphasize that by understanding their causes, symptoms and mitigation measures, students can reduce the risks of the diseases. The action projects are anticipated to focus on one aspect of epidemic prevention - for example, encouraging people to cover up especially in the morning and evening, or to be able to recognise what could be symptoms of one of the diseases.

While planning the project could be completed in one class, allowing students to work on the project as homework and then present their project plan in the following class would enable greater consideration of all aspects of the project. As proposed in the extension activity, allowing students to implement their projects would enable them to apply their learning, demonstrate leadership, and learn from others' projects.

During *Step 1*, you might highlight examples of actions taken by others to prevent the spread of diseases. *Box 12* gives some examples: a Red Cross Society video setting out how to prevent the spread of Zika virus, a video of a child-led action project in El Salvador, documents on a historic disease mapping project and a blog on actions that have been taken in SVG to reduce the spread of disease. Have students watch the videos and discuss the examples. What are actions for preventing disease demonstrated in these examples?

During *Step 2*, it would be good to invite key school and community stakeholders to class to inform them of and get their feedback on students' project plans. For example, the SVG Red Cross Society has experience developing and implementing action projects to prevent the spread of diseases. Representatives could be invited into class to share their experiences and help improve students' plans.

Once students have finished planning, and if time allows implementing their projects, encourage them to consider their initiatives' sustainability. Ask students to discuss:

how they can make sure the positive impacts of their projects continue and how they could continue or develop their projects.

Box 12: Epidemic Prevention Examples

SVG Red Cross Society taking action on Zika

To help prevent the spread of zika, the SVG Red Cross Society has made a short video, setting out how zika spreads and what can be done to prevent it. The video is available at

<https://www.facebook.com/SVGRedCross/videos/vb.124783107539497/2002562179761571/?type=2&theater>

Cleaning up in El Salvador

In El Salvador, children of Potonico, in the municipality of Chalatenango, organized a cleaning campaign during the rainy season to reduce the threat of mosquito-borne illnesses such as dengue fever and malaria. With support from local health workers they went from house-to-house to raise awareness of the danger of stagnant water where mosquitoes breed and helped to clean up back yards. As a result, Potonico reported a drop in cases of dengue fever compared with neighboring communities.

Source: Taken from Plan International. 2010. *Child-centred Disaster Risk Reduction: Building Resilience through Participation – Lessons from Plan International*, 6. <http://www.plan-uk.org/resources/documents/33987/>

For more information watch the YouTube video on the El Salvador children's campaign: <https://www.youtube.com/watch?v=fmHDRE0qWdk>.

Mapping to understand Cholera

In the world of the 1850s, cholera was believed to be spread by miasma (unhealthy vapour) in the air. Germs were not yet understood and the sudden and serious outbreak of cholera in London's Soho was a mystery. A man called John Snow mapped the cases. The map essentially represented each death as a bar. It became apparent that the cases were clustered around the pump in one particular street, Broad (now Broadwick) street. It turned out that the water for the pump was polluted by sewage from a nearby cesspit where a baby's nappy contaminated with cholera had been dumped. Mapping is still a very important part of controlling epidemics like cholera. For example Haiti experienced a devastating cholera outbreak following the Earthquake in 2010. Mapping new reports of cholera, the location of safe water installations and cholera treatment centers was and continues to be vital in efforts to contain the disease.

<https://www.theguardian.com/news/datablog/2013/mar/15/john-snow-cholera-map>
<https://reliefweb.int/report/haiti/haiti-cholera-outbreak-interactive-map>

Disease Prevention in St. Vincent and the Grenadines

SVG has successfully taken a number of measures to reduce the spread of diseases. The country achieved an all-time high of 98% of the population having access to clean water in 2010. This enormously limited the number of diseases spread by poor water sanitation. Less than three percent of the population of SVG has HIV/AIDs, dengue, tuberculosis or leptospirosis. This is due to national programs such as the Expanded Program on Immunisation, which maintained a rate of 95-98 percent of immunisation of children under five years old. Another program that helped to achieve these figures is the Prevention of Mother-to-Child Transmission Program, which tested all pregnant women for HIV/AIDS and gave antiretrovirals, free of charge, to those who were positive.

<https://borgenproject.org/common-diseases-in-st-vincent-and-the-grenadines/>

Curriculum Links

This activity falls under the Form 3 Health and Family Life Education 'Health Promotion' theme under the achievement indicator 'Demonstrate basic skills in implementing methods for enhancing the environment' and under the Disaster Preparedness theme where there are achievement indicators design a community disaster plan.'

Source: Parts adapted from Selby and Kagawa (2014). Disaster Risk Reduction Education Toolkit. (St Michael: CDEMA).

Strand 5: Human-Made Hazards and Epidemics

Unit 5: Epidemics

Topic 3: Climate Change, Health and Vulnerable Groups

Activity 15: Chancing Climate Change Game

Purpose: Reflecting on factors that make people more or less vulnerable to the health impacts of climate change.

Time needed: 75 minutes

Resources needed

- Copies of the poster downloadable from <https://bigpictureeducation.com/sites/default/files/Health%20and%20Climate%20Change%20poster.pdf> - one between two or three students
- A dice per group of four or five
- A copy of *Chancing Climate Change Game* per group of four or five
- A cut-up set of *Profile Cards* per group
- A counter or small disk per person so that in each group, each player has a different coloured counter or disk
- A4 pieces of paper, each cut up into eight blank 'cards' - 20 cards per group

Procedure

Step 1: Give out copies of the *Health and Climate Change* posters. Ask students to make a list of all how climate change can affect human health. (10 minutes)

Step 2: Have students call out their ideas and write these on the board or a sheet of flip chart paper. (5 minutes)

Step 3: Have students divide into groups of four or five. Give each group a copy of the *Chancing Climate Change Game* and a set of *Profile Cards*. Ask each group to shuffle and deal out the *Profile Cards* to have two. These cards represent the characteristics of each student's profile for the game. Have students play the *Chancing Climate Change Game*. Explain that some of the squares have climate change-related health events on them. Taking it in turns, each student should roll the dice and move forward that number of squares. If they land on a climate change health event square they should move back three squares. If there is some reason why the health event is worse for them given their profile - they must move back six. They should agree whether the player must move back three or six squares as a team. The next player should then have their turn. The game finishes when one player reaches the *End* square. (20 minutes)

Step 4: As a class, brainstorm actions, personal, local and national, to make people more resilient climate change health events that arise in the game. Have students consider which actions, in particular, make their profile person more resilient to the health events that occur in the game. Ask each student to choose four of these

actions and to write them on the blank cards (one action per card), making them 'resilience cards'. Shuffle the cards written by all group members and redistribute them so that each student has four resilience cards. (10 minutes)

Step 5: Have students replay the game, this time with each player having four resilience cards. When students land on a climate change health event square, the group should decide if they should go back three or six squares as before or whether they are protected by one of their resilience cards and don't need to go back. The game finishes when one of the players reaches the end square. (20 minutes)

Step 6: Come together as a class and debrief the activity. What made people more vulnerable to climate change? What made them less vulnerable? How do students feel about climate change following the game? (10 minutes)

Extension

Have students work in groups designing their games to explore the health impacts of climate change.

Potential/Facilitation Tips

This activity will support students in exploring the many health impacts of climate change and factors making people more or less vulnerable to these impacts. The game's object is not the competition but a discussion about how the events impact different people. In the final discussion, encourage students to share their thoughts and feelings about climate change and its health consequences. The game may provoke discussions around the injustices and uncertainties associated with climate change

Curriculum Links

This activity falls under Form 3 Health and Family Life Education; in particular, the theme of 'Health Promotion' under which the achievement indicators include 'Decide to personally reduce their exposure to environmental hazards'. It also compliments Form 3 Integrated Sciences and Technology: in particular, the theme of 'Earth's weather and climate' where the achievement indicators include 'Describe the effects of climate change on the human & natural environments.'

Chancing Climate Change Game

Deal out the profile cards - two cards each. Roll the dice to see how many squares you move forward. If you land on a climate change health event go back three. If you are particularly affected by the event, due to your profile cards go back six. Who reaches the end first?

25	26	27 Rising temperatures and acidification of the oceans damages coral reef and reduces fish stocks.	28 The temperature reaches and stays at record highs; this impacts on crops and human health.	29	30 End
24	23 Flooding has caused water supplies to become contaminated leading to diarrhoeal diseases.	22	21	20 There is drought, causing crop failure and increase food prices.	19
13	14 Climate change increases epidemic outbreaks and now there is an outbreak of Zika in your area.		16	17	18 With increased temperatures pollution levels in the town are at a record high.
12	11	10 Increase sea-levels means once again there is coastal flooding in your area	9	8 Climate change increases epidemic outbreaks and now there is an outbreak of Dengue Fever in your area.	7
1 Start	2	3	4 Climate change means increased storms. Storms cause injury and risk to life.	5 Recent storms have disrupted water supplies causing a cholera outbreaks.	6

Profile Cards

<p>You are a pregnant woman with a large family</p>	<p>You are an elderly man with little to live on</p>
<p>You are a young girl who uses a wheelchair</p>	<p>You are a woman who has recently been very ill and you are still suffering from poor health</p>
<p>You are a young mother who grows her own food</p>	<p>You are a woman who lives by the coast and must travel each day to work.</p>
<p>You are the father of a large family and no one in the family is in secure employment</p>	<p>You are a young boy who lives by a river</p>
<p>You are a teenage boy who suffers from asthma</p>	<p>You are the eldest boy in the family; you live in a small house in town with your siblings, parents and grandparents.</p>

Strand 6: Planning for Disasters
Unit 6: Wider Community DRR
Topic 1: Community HVCA

Activity 16: Community Disaster Risk Mapping

Purpose: Identifying the community's vulnerability to disaster and its capacity to prevent and mitigate disaster

Time needed: 75 -120 minutes

Resources needed

- Flip chart paper and set of different colour markers for each group of four or five students
- A copy of the *Community Vulnerability and Capacity Checklist sheet* per group and a pen/pencil
- A transect map per group (i.e., a local map of around the school with a few transect routes marked up by yourself)
- For each student on the transect walk: writing pad, pens and pencils
- A blank A4 sheet of paper per group
- Tape or other adhesive material for sticking charts to walls

Procedure

Stage 1

Step 1: Ask students to form groups of four or five. Give each group a sheet of chart paper and set of different colour markers. Explain to the students that they are to draw a community map of the area surrounding the school from their existing knowledge. Specifically, their task is to include: (1) key geographical information (e.g., rivers, ponds, mountains/hills, woods, beaches, crop fields); (2) key buildings and infrastructures (e.g., schools, hospitals/health centers, roads, bridges, religious buildings, water facilities, shops, houses); and (3) the four compass directions (north, south, west, east). (15 minutes)

Step 2: Once groups have finished drawing their map, ask them to discuss and mark on their map the areas where, to their knowledge, natural and human-made hazards (e.g., earthquakes, flooding, landslides, droughts, hurricanes, fires, traffic accidents) have caused damage in the past and might also in the future. Ask them to mark down features they know of that have been put in place to protect the community against hazard. (15 minutes)

Step 3: Invite each group to present their map. Have groups compare and contrast the maps presented. Lead a whole-class discussion (15 minutes)

Stage 2

Step 1: Give groups a copy of the local map indicating a few transect routes. Explain that groups are to walk different transects through the area represented on the map appointed to them to acquire firsthand information regarding the physical environment, local vulnerability to potential hazards, and things that have been done and not done to deter hazards.

Explain also that their investigation will be conducted not only through observation but also through interviews. Tell students that they are to remain in the same groups as for *Stage 1* and that one adult will accompany each group. Give each group a copy of the *Community Vulnerability and Capacity Checklist* handout. Make sure that students are clear about what they will be looking for during the transect walk by inviting their questions and checking their understanding of detail. Also, explain that they can discuss questions with the adult member as they go around. Once you are sure everyone understands the task, ask them to begin their transect walks. (30 – 45 minutes for the community transect work).

Stage 3

Step 1: Back in class, ask groups to add new information gathered during the community transect walk to the map they created during *Stage 1*. Also, ask them to summarize key interview data that could not be included in the map as bullet points on a sheet of A4 paper. (25 minutes)

Step 2: Have each group hang their maps and interview data summary on the classroom wall and encourage students to carefully scrutinize each other's work, groups at all times having a 'host' available to explain their work to 'visitors'. (10 minutes)

Step 3: In the whole class session, discuss differences and similarities between the maps. Also, discuss the local areas and causes of vulnerability and what has been done and what should be done to reduce hazard risk to the community. Encourage the class to raise further questions they would still like answers. Keep a record of these questions on the board or chart paper. (30 minutes)

Extension

Arrange and undertake additional, previously un-walked transects. Encourage groups to engage adults to discuss the local causes of vulnerability and what has been done and still needs to be done to reduce hazard impacts on the community. Have each group present and report on what has been learnt to the whole class.

Potential/Facilitation Tips

The transect walks give students opportunities to examine the area's topography and the intersections between the physical environment and human activities. The walks help students identify dangerous areas, the conditions that increase vulnerability to hazard, and evacuation sites and local resources to be drawn upon during emergency events.

As the secondary students are likely to come from wider catchment areas, this activity helps increase their understanding of the area adjacent to the school.

Prepare the out-of-school transect walks in good time, ensuring permission is obtained from the principal and consent is secured from parents or guardians, and agreement given by parents and community members (ideally members of the School Disaster Management Committee and/or members of the Community Disaster Management Committee) to help with the transect walks. Explain to the participating adults that their task during the walks is to ensure student safety and to offer contextual information and advice without dominating student-led inquiry. It is highly recommended that the same adult members also attend pre- and post-transect walk classroom sessions (*Stage 1* and *Stage 3*). The pre-session will help them understand students' existing knowledge of the locality, and their observations and feedback will enrich the post-session.

Curriculum Links

This activity aligns with the 'Disaster Preparedness' learning outcome in the Form 3 Health and Family Life Education curriculum, which includes indicators that students 'examine disaster preparation strategies for SVG' and 'design a community disaster plan.' It also supports learning falling under the 'Listening and Speaking' section of the Form 3 English curriculum, where Learning Outcome 1, Achievement Indicators 12 and 13 call for conducting of short interviews.

Source: Adapted from Selby & Kagawa (2014). Disaster Risk Reduction Education Toolkit. (St Michael: CDEMA)

Handout: Community Vulnerability and Capacity Checklist

1. Observe and take notes on the following:

<p>Natural Environment What are the special features of the natural environment in the area?</p>	
<p>Ground Level How close is the area to large bodies or flows of water? What is the ground level of the area? How high is the ground above the water?</p>	
<p>Land/Road What are the land and road conditions like in the area?</p>	
<p>Vulnerabilities What are the conditions that increase vulnerability to hazard in the area? (E.g., soil erosion, deforestation, steep and tree-less slopes, closeness to beaches/ivers)</p>	
<p>Capacities What capacity is there to reduce disaster risk in the area? (E.g. water harvesting systems, tree planting, barriers, soil/water conservation measures)</p>	

2. Ask questions to random adult respondents during the walk (Talk to minimum 3 people and make notes on your writing pad):

- Has the area been affected by any natural hazard or disaster before? If so, when did it happen and what happened? Were some areas affected more than others? Why did that happen? Where are these areas located?
- What has been done in the area to protect the community against natural hazards and reduce the effects of any hazard?
- What are the hazards likely to affect the area in the future? What would be the possible effects?
- Where is the nearest safe place to go to in the event of specific natural hazards?
- What still needs to be done in the locality to protect against possible hazards?

Strand 6: Planning for Disasters

Unit 6: Wider Community DRR

Topic 2: Understanding a Community Disaster Management Plan

Activity 17: Understanding Community Disaster Management Plans

Purpose: Familiarizing students with community disaster management plans; creating a child/youth-friendly version of a community disaster management plan for wider dissemination across the younger generation in the community.

Time needed: 50 minutes

Resources needed

- A copy of the Community Disaster Management Plan per group
- Colour pens

Procedure

Stage 1

Step 1: Inform the class that a Community Disaster Management Committee (CDMC) member will be visiting the class and that they will have an opportunity to ask questions to understand their work better and the Community Disaster Management Plan (CDMP). Have students form groups of four and give each group a copy of the CDMP. Have them read the document and develop a list of questions they would like to ask the CDMC guest speaker. Give some space for class sharing and discussion of the questions developed. (30 minutes)

Stage 2

Step 1: Welcome the CDMC member to the class and introduce her/him to students. Ask the guest to introduce the CDMC's work and the Community Disaster Management Plan focusing on how the Committee and Plan contribute to community safety and resilience building. (15 minutes)

Step 2: Encourage students to put their questions to the guest speaker. The questions should be drawn from those they prepared and give space for questions spontaneously triggered by what they hear. (45 minutes)

Potential/Facilitation Tips

Importantly, arrange the CDMC member's visit well in advance and get hold of copies (or make photocopies) of the Community Disaster Management Plan in good time. Choose the CDMC for the area adjacent to the school to apply what they have learned during the transect walk (*Activity16*).

Explain to the speaker how the class time will be organized and what students have done so far and ask her/him to highlight how secondary students could contribute to various community disaster management activities.

Stage 1 aims to raise student awareness of the Community Disaster Management Committee and its Plan before the guest speaker's visit. If the plan document is long, assign specific sections to each group to examine rather than read the whole document. Encourage students to reflect upon their community transect walk experience. A key question is: Does the Community Disaster Management Plan address the issues (vulnerabilities and capacities) they have noticed?

During *Stage 2, Step 2*, encourage students to suggest possible contributions they think they can make to community disaster management planning and action.

Curriculum Links

This activity aligns with the 'Disaster Preparedness' learning outcome in the Form 3 Health and Family Life Education curriculum, which includes indicators that students 'examine disaster preparation strategies for SVG' and 'design a community disaster plan.'

Strand 6: Planning for Disasters

Unit 6: Wider Community DRR

Topic 3: Developing Student DRR Community Action Plans

Activity 18: Advocating for Greater Disaster Awareness in the Community

Purpose: Building on community vulnerability and capacity mapping work (*Activity 16*) and understandings of the Community Disaster Management Plan (*Activity 17*), developing safety and disaster risk messages and communicating them with local community members

Time needed: 65 minutes plus periods over a couple of weeks (*Stage 2*)

Resources needed

- Vulnerability and capacity maps as created for *Activity 16*
- A sheet of chart paper and markers
- Various materials needed for developing communication materials (e.g., poster papers, markers, painting materials, display board, pins/tapes)

Procedure

Stage 1

Step 1: Have students re-form the groups assembled for *Activity 16*. By reviewing their vulnerability and capacity maps and reflecting on what they have learnt about the Community Disaster Management Plan (*Activity 17*), ask each group to identify key disaster risk and safety messages they would like to share with the local community to raise their disaster awareness. Have them write the messages down on chart paper. (10 minutes)

Step 2: Explain to students that they will share their messages with local community members who will be invited to the school on specific day(s). Ask groups to discuss how they can most effectively share their messages with the local community members. Communication modalities may include poster or photo displays, murals, songs, dance or mime, a skit/drama and/or a puppet show. Have them write down their ideas on chart paper to form a communication plan. (10 minutes)

Step 3: Invite each group to present their communication plan to the whole class. As each group presents, encourage others to offer constructive suggestions on how the group's plans might be made more effective. After the presentation, have groups put the finishing touches on their plans. (15 minutes)

Stage 2

Give students time, space and support to do all the work necessary to prepare for and then implement their communication plans on the agreed day(s) at school.

Make sure that everyone has a part to play in preparing and implementing the communication plan.

Stage 3

Once the plan is implemented, hold a class debriefing session to reflect on community members' reactions and responses and how they would approach awareness-raising activities differently next time. (30 minutes)

Potential/Facilitation Tips

This activity follows organically from earlier work on mapping community vulnerability and capacity and understanding the Community Disaster Management Plan.

Given the community involvement dimension to the work, it is important to obtain 'in principle' support from the head teacher. Consult with her/him about the specific dates/times and school spaces to be used for the DRR awareness-raising event.

It is also essential to liaise with the School Disaster Management Committee members and the Community Disaster Management Committee so that news of the event at school is widely disseminated and well supported and well attended.

Monitor what happens when students put their communication plans into effect and look out for opportunities for them to work in and with the community on disaster risk reduction to create synergies with ongoing community-level initiatives.

Curriculum Links

This activity aligns with the 'Disaster Preparedness' learning outcome in the Form 3 Health and Family Life Education curriculum, which includes indicators that students 'examine disaster preparation strategies for SVG' and 'design a community disaster plan'.

Source: Adapted from Selby & Kagawa (2014). Disaster Risk Reduction Education Toolkit. (St Michael: CDEMA)

Strand 7: Marine Environment
Unit 7: Sustainable Oceans
Topic 1: Plastic in the Oceans

Activity 19: Plastic Oceans Debates

Purpose: Researching, thinking critically about and debating the problem of plastic in the oceans

Time needed: 2 hours and 20 minutes

Resources needed

- Pieces of paper, one saying 'agree' and one saying 'disagree'
- Internet access for about twelve students
- A copy of the *Walking Debate Statements*
- *Motions for Debate* printed or written out on separate pieces of paper
- Stopwatch
- Two small tables - one for each debating team
- Paper and pens
- Cut-up set of *Roles for Debate* cards, one per group of ten

Procedure

Step 1: Before starting the lesson, ask students to read *Caribbean beaches are littered with single-use plastics*, available at <https://blogs.worldbank.org/opendata/caribbean-beaches-are-littered-single-use-plastics> as homework. Place the 'agree' and 'disagree' pieces of paper on opposite walls with an open space in-between. Call out the first statement from the *Walking Debate Statements* and have students position themselves at any point between agreeing and disagreeing depending on how they feel about the statement (the closer to the paper, the more they embrace the position). Invite students to explain why they have positioned themselves as they have and encourage discussion. Repeat this step for each of the other statements. (15 minutes)

Step 2: Have students brainstorm all the things they use plastic for and write these up on the board or flip chart paper. As a class, discuss why plastic is used in these ways. (15 minutes)

Step 3: Watch the videos: 'Paradise Lost in a Sea of Plastic' at <https://www.youtube.com/watch?v=nf8QHkSZr88>. (1.42 minutes) and 'Giant Mass of Plastic in Caribbean' <https://www.bbc.co.uk/news/av/world-41866046/the-giant-mass-of-plastic-waste-taking-over-the-caribbean> (1.37 minutes). Read out the information in *Box 13: Action on Styrofoam in St. Vincent and the Grenadines*. Let students discuss their feelings after watching the videos and listening to the reading. Then have them share any questions that arise from watching the videos and hearing about local action. (10 minutes)

Box 13: Action on Styrofoam in St. Vincent and the Grenadines

In 2017 the Government of St. Vincent and the Grenadines banned the importation of Polystyrene (Styrofoam) products. Styrofoam is not biodegradable and is difficult to recycle. It is used to package food and drinks. It is also thought to cause cancers. The ban aims to stop the importation manufacture and sale of styrofoam food products in SVG and to encourage the use of environmentally friendly food containers. The ban is one example of actions taken across the Caribbean to limit the use of different plastics.

Sources: <https://pressroom.oecs.org/st-vincent-and-the-grenadines-bans-non-environmentally-friendly-material--styrofoams>
<https://www.apanamagazine.com/caribbean-governments-ban-plastic-styrofoam/>

Step 4: Explain the concept of a debate by organising the learning space as if the debate were to happen. For example, two tables, each with two chairs positioned opposite each other at the front of the class. Explain that a debate is organised around an issue or ‘motion.’ Explain that one side argues in favour of that motion and the other side against the motion. Discuss what can make an argument more persuasive, for example: giving reasons, examples, statistics, analogies, quotes and appeals to the audience’s own experience. (5 minutes)

Step 5: Divide the class into groups of ten. Refer to the *Roles for Debate* handout below and explain the roles of all the people within the debate. If necessary, due to numbers, there can be extra researchers and/or the chairperson and judge who can act in more than one debate group. Give each group a different debate ‘motion’ from the *Motions for Debate* box, or choose your motions. In each group, allocate four students to be a team arguing in favour of the motion (two researchers and two presenters) and four students to be a team arguing against the motion (two researchers and two presenters). One student in each group should be the chairperson and one student in each group should be the timekeeper. Give each student (or pair) their *Roles for Debate* description. (5 minutes)

Step 6: Have students prepare for the debate as set out in their role descriptions. Allow the researchers to access the websites suggested below for information on plastics in the ocean and in particular on plastics used in particular plastic pollution in St. Vincent and the Grenadines and the Caribbean. The chair people and timekeepers for all the groups should work together to clarify the rules of the debates and then share these with the debating teams. (20 minutes)

Step 7: Once the participants have been given adequate team time to prepare, hold the debates. Have the chairpersons introduce each debate. Have each group debate their motion, with one team arguing for and one team arguing against. Have the timekeeper in the group keep time. Have all other students participate as an audience. At the end of each formal debate, ask the chair people to invite the audience to ask questions and voice their own opinions about the debate and the motion. It is suggested that each presenter be given three minutes to speak. The chairperson should be given a maximum of three minutes to introduce the debate and five minutes allowed at the end for questions so that each debate is a total of

twenty minutes. At the end of the debate, allow students to voice their perspectives, which may be different from the positions allocated in the debate. (70 minutes)

Extension

Provide an opportunity for rebuttal. Once both team presenters from both teams have made their first argument, the teams can be given five minutes to prepare a response to the arguments made by the other team. Each debate participant has an additional two minutes to make a further argument. When this second round is complete, the audience is asked to judge. (25 minutes)

Potential/Facilitation Tips

The debate approach enables students to think critically about the impact of plastics on the oceans, why plastic continues to be used despite the consequences of its use and the importance of limiting plastic use and of challenging its use. Students may disagree with the position they have to take, but arguing alternative perspectives should encourage them to reflect on the issue critically. At the close of the debates allow students to voice their perspectives, having reflected on all sides.

Curriculum Links

This activity falls under Form 3 Social Sciences; in particular, the theme of the 'Environment' under which the achievement indicators include 'Identify and describe how the environment can be polluted (land, sea, air) through human activity.' It also compliments Form 3 English: in particular Learning Objective 2 'communicate to send and receive information' under which the achievement indicators include 'orally express information in a logical sequence' and 'express ideas clearly and fluently.'

Walking Debate Statements

I use plastics every day
I have seen plastics in the sea and on the beach
St. Vincent and the Grenadines has done a lot to reduce the use of plastics
Plastics badly impact the Caribbean Sea
Wrapping things in plastic is necessary to keep them clean
I am not responsible for any plastic that ends up in the ocean

Motions for Debate

St. Vincent and the Grenadines should stop using single-use plastics immediately!
Plastic is good for human health!
Plastic in the Caribbean Sea is more of a problem for sea creatures than for humans!

Websites for Research

- <https://blogs.wwf.org.uk/blog/habitats/oceans/marine-turtles-and-plastics/>.
- <https://www.wwf.org.uk/updates/how-does-plastic-end-ocean>
- <https://blogs.worldbank.org/latinamerica/together-we-can-beat-marine-pollution-caribbean>
- <https://www.marineinsight.com/environment/how-is-plastic-ruining-the-ocean/>
- <http://www.kidsagainstplastic.co.uk/learn/>
- <https://www.worldoceansday.org/about>
- <https://www.apanomagazine.com/caribbean-governments-ban-plastic-styrofoam/>
- <https://caribbeantradelaw.com/2018/03/28/plastic-waste-emergency-in-caribbean-sea-what-is-the-region-doing-about-it/>

Debating Roles

Role	Responsibility
Chair People	<i>Before the debate:</i> Work with the timekeepers to draw up the list of debate rules and set up the debate tables. <i>During the debate,</i> introduce the debate's topic (or motion) and the team members from both sides. Invites the audience to voice their opinions.
Timekeepers	<i>Before the debate:</i> Work with the timekeepers to draw up the list of debate rules and set up the debate tables. <i>During the debate:</i> Measures the time allowed for each speaker and inform them when their time is finished.
Debating Team 'For'	Team of two people who prepare and present an argument in agreement with the motion, and who also might be called upon to rebut the argument of the other side
Researcher Team 'For'	Two people research and prepare the argument in agreement with the motion.
Debating Team 'Against'	Team of two people who prepare and present an argument against the motion and who also might be called upon to rebut the other side's argument.
Researcher Team 'Against'	Two people research and prepare the argument against the motion.

Source: adapted from Mallon, Waldron, Oberman and Keating (2017)
Making Rights Real: Learning Activities and Actions on Children's Rights for Children, OCO: Dublin <https://www.oco.ie/app/uploads/2017/12/MakingChildrensRightsReal>

Strand 7: Marine Environment
Unit 7: Sustainable Oceans
Topic 2: Sustainable and Unsustainable Fishing Practices

Activity 20: Fishing Investigation

Purpose: Exploring and comparing fishing methods and investigating local fishing practices

Time needed: 195 minutes (65 minutes for stage one and 160 minutes for stage 2)

Resources needed

- Paper, graph-paper and pens
- *Fishing Issues Information Sheets*, one sheet per student
- *Fishing Methods Cards* - one per group of four cut-ups or access to www.seafoodwatch.org/ocean-issues/fishing-and-farming-methods
- Internet access to the SVG *National Report to the Caribbean Fisheries Forum* is available at http://www.crfm.int/~uwohxjxf/images/Agenda_Item_7_Ref_Doc_i_-_St._Vincent_National_Report.pdf.

Procedure

Stage 1

Step 1: Have students work in groups of four. Have them brainstorm what they know about the fish they eat: the names of the fish, where and how they were caught, and their abundance (or diminishing abundance) in the ocean. During the brainstorming session, have each group record their information on a chart and bring the class back together to share ideas. (15 minutes)

Step 2: Divide the class into four research groups ensuring that at least one member from *Step 1* joins each of the research groups. Give each research group one of the fishing issues to research: overfishing, bycatch, habitat damage and aquaculture pollution and disease. For their research, they should visit the www.seafoodwatch.org/ocean-issues or use the respective printable versions provided below in the *Fishing Issues Information Sheets*. Have students read and discuss their information and prepare a short presentation on their fishing issue about: What is the problem? Why is it happening? What is happening as a result? (15 minutes)

Step 3: Have students rejoin their initial group so that each group has a student who has researched each of the fishing issues. Give each group a set of *Fishing Methods Cards* or look at the videos and images of the fishing methods available at www.seafoodwatch.org/ocean-issues/fishing-and-farming-methods. Have each group consider each of the fishing methods in respect of the issues they have discussed. Have students rank the methods according to which they feel are most

'sustainable' and cause the least environmental issues down those which are least sustainable and cause most environmental issues. (15 minutes)

Step 4: Come together as a class and ask each group to share their ranking. As a class, discuss: Why do fishers in some parts of the world use the more harmful methods if they cause damage? How do these fishing actions affect the sustainability of the resource? Which fishing methods do they think are most used in SVG? Are there methods used locally that are not described here? If so, how do they think those methods would rank in terms of sustainability? (20 minutes)

Stage 2

Step 1: Have students work in groups of two to four to develop a research project exploring the types of fish sold locally and the fishing methods used. Use the *Fish Investigation Questions* below (Box 14) as a suggestion. Have students visit the local shop or market as a field trip or as homework to conduct their research. If possible, have students write questions for and interview fishers selling or supplying fish locally about their practices and experiences of fishing. (60 minutes)

Box 14: Fish Investigation Question Suggestions

- Where are the fishes sold in your community?
- What are the types of fish sold at each place?
- From where do the fish come?
- Is it all local, or is any fish imported? If so, from where?
- Is the fish fresh or treated?
- How is it caught? What sort of boat is used? To which landing site is it brought?
- What is the price of the different fish and at other locations?
- What is the most popular fish species?
- What is the frequency of different fish species in the markets?
- Are these fish plentiful, or are any of them facing overfishing?

Step 2: In their groups, have students prepare a presentation on their findings. Have students represent some of their data in graphs and charts. Each presentation should interpret the data, assess the environmental implications of the fish consumed in the community and highlight any data that particularly surprised them. (40 minutes)

Step 3: Have students present their findings to the class. (40 minutes)

Step 4: Have students read through the SVG *National Report to the Caribbean Fisheries Forum* available at http://www.crfm.int/~uwohxjxf/images/Agenda_Item_7_Ref_Doc_i_-_St._Vincent_National_Report.pdf.

Have students compare their research findings with the report's information. As a class, the comparisons students have drawn. (20 minutes)

Potential/Facilitation Tips

This sequence of activities enables students to consider local fishing practices in the context of broader global fishing activities. It allows them to consider sustainable and unsustainable fishing practices and weigh up different methods. Encourage students to develop the research projects pursuing their lines of interest.

Curriculum Links

This activity falls under Form 3 Social Sciences; in particular, the theme of the 'Environment' under which the achievement indicators include 'identify and describe how the environment can be polluted (land, sea, air) through human activity.' It also compliments the Form 3 'Earth' Resources' theme of the Integrated Science and Technology syllabus, which addresses 'the adverse consequences associated with man's use of natural resources'

Source: Adapted from NOAA Office of National Marine Sanctuaries Sustainable Seafood Lesson available at: <http://sanctuaries.noaa.gov/education>.

Fishing Issues Information Sheet 1- Over-fishing

As fishing methods have got more efficient, overfishing, catching fish faster than they can reproduce, has become an urgent issue and is one of the biggest threats to ocean ecosystems. Today, roughly one-third of assessed fish populations are overfished and over half are fully-fished.

Fish that are large in size, live a long time and are slow to reproduce are among the most vulnerable to overfishing. For instance, of 465 shark species, 74 are listed as vulnerable, endangered or critically endangered list. Several species of rockfish, a group of Northeast Pacific fish also known as snapper that can live to be over 100 years old, were severely depleted by years of overfishing. Despite new and effective fishing restrictions, it will be decades before these long-lived fish recover.

When one kind of fish is no longer plentiful, fishermen may move on to new species. Scientists have documented a gradual transition in fisheries landings over the last few decades from high-level predators such as tuna and cod, to species lower in the food web, like crabs, sardines and squid—a phenomenon known as ‘fishing down the food web.’` Since these lower-level species are often important prey for other fish, as well as seabirds and marine mammals, their removal impacts species throughout the ecosystem.

The ocean’s ecosystem, and the food on our tables, isn't the only thing affected by overfishing. As fish stocks reduce, fishermen find it increasingly difficult to make a living. When this happens, coastal economies can be devastated

Source: <https://www.seafoodwatch.org/ocean-issues/wild-seafood>

Fishing Issues Information Sheet 2- Bycatch

Many fisheries around the world throw away more fish than they keep. Some of the biggest offenders are shrimp fisheries. In the worst cases, for every pound of shrimp caught, up to six pounds of other species are discarded and this incidental catch of unwanted or unsellable species, known as 'bycatch,' doesn't just include fish as turtles, seabirds and other animals also suffer.

Bycatch is the result of using less selective fishing gear like gillnets, longlines or bottom trawls. Longlines have baited hooks and can extend for 50 miles or more. When cast out and left to 'soak,' longlines and gillnets attract anything that swims by, from sharks to sea turtles. Bottom trawls drag nets across the seafloor, catching everything in their paths.

In contrast, gear like hook-and-line fishing can limit bycatch because fishermen can quickly release unwanted catch from their hooks since lines are generally reeled in soon after a fish takes the bait.

More than 15 percent of shark species are threatened with extinction, in part as a result of being caught accidentally on longlines, trawls and purse seines. Bycatch also includes young fish that could rebuild populations if they were allowed to grow and breed.

Hundreds of thousands of sea turtles, seabirds and marine mammals, including whales, dolphins and porpoises, die as bycatch. As many as 200,000 loggerhead sea turtles and 50,000 leatherback sea turtles are caught annually. Fishing also kills hundreds of thousands of seabirds when they become entangled in gillnets, caught on longline hooks or interact with trawls.

Fishermen don't want to haul in bycatch, it wastes their time and damages their gear. Gear modifications, closed areas, and more selective fishing methods can help reduce this waste. Cost-effective 'streamer lines' (lines with bigger flies, as baits, towed from a high point) are dramatically reducing seabird deaths in the Pacific halibut and Patagonian toothfish longline fisheries.

Source: <https://www.seafoodwatch.org/ocean-issues/wild-seafood>

Fishing Issues Information Sheet 3 - Habitat Damage

Gear that drags across the seafloor, like trawls and dredges, can destroy delicate habitats that provide shelter, food and breeding grounds for fish and other species. In heavily trawled areas, it's the equivalent of clear-cutting a forest.

Among different fishing gear, bottom trawling and dredging are top offenders. In general, traps and pots cause less seafloor damage and catch fewer non-targeted species than other types of fishing gear that contact the seafloor. Bottom trawls can remove deep water corals and sponges. In many areas, marine life and seafloor communities have no chance to recover; parts of the North Sea off Denmark in Europe have been trawled up to 400 times a year!

Source: <https://www.seafoodwatch.org/ocean-issues/wild-seafood>

Fishing Issues Information Sheet 4 - Pollution and Disease from Aquaculture

Aquaculture refers to the farming of fish in fish tanks or enclosed areas often within oceans, as opposed to catching them from the wild. Fish farming has been practiced, in some parts of the world, for hundreds of years. While currently there is no aquaculture industry in St. Vincent and the Grenadines, it's development is a possibility.

Farming fish means having many fish in small areas and this results in concentrated waste. Combined with uneaten food pellets, fish waste can impact the local environment by polluting the water and smothering plants and animals on the seafloor. There are also concerns that diseases and parasites, common occurrences in crowded pens, are spread to wild fish.

When net pens are located near the migration routes of wild fish populations, there is the potential for on-farm diseases to be transmitted to passing wild fish. Pesticides and antibiotics used to control diseases and parasites can also be discharged into the environment, impacting local species (and passing into the food chain to humans).

Many types of aquaculture require chemical treatments for a successful harvest. The amount of active chemicals released into the environment determines their effect on other organisms and human health. Frequent application can reduce treatment effectiveness and the emergence of antibiotic-resistant bacteria can affect our ability to treat human diseases.

Onshore, 'closed farms contain wastes and other byproducts, making them easier to treat. These farms can also be located away from sensitive habitats where fish feed and spawn.

Source: <https://www.seafoodwatch.org/ocean-issues/aquaculture>

Fishing Methods Cards

<p>Pots and traps are cages or baskets that hold species such as lobsters, crabs and Pacific cod alive until fishermen return to haul in the catch. They have one or more openings. The second opening allows fish or smaller catches to escape. They are usually placed on the seafloor. Unwanted species can be released alive. Sometimes whales and other species can get entangled in them.</p>	<p>A cast net, also called a throw net, is a circular net with small weights distributed around its edge. The net is cast or thrown by hand in such a manner that it spreads out while it is in the air before it sinks into the water. Fish are caught as the net is hauled back in. This simple device is particularly effective for catching small bait or forage fish, and has been in use, with various modifications, for thousands of years.</p>
<p>Bottom trawls are cone-shaped nets that are pulled along the seafloor by one or two boats. Often they catch many fish and sea creatures that they did not intend to catch and the heavy gear can damage seafloor habitats. To reduce the damage they cause, their use can be limited by regulating when and where trawling can occur, or else the gear can be modified to allow unwanted marine life to escape.</p>	<p>Harpoons are poles that have a steel point with one or more barbs at the end. Spearguns are tube-shaped guns that fire barbed spears and are used underwater. When a fishman targets a fish, he thrusts or shoots the harpoon into the animal and hauls it aboard.</p>
<p>Dredges are metal-framed baskets that are dragged across the seafloor to collect shellfish. Towed dredges scrape or dig into the substrate with rakes or teeth to about a foot in depth, harming habitats.</p>	<p>Pole-and-lines are poles with a single line, hook and bait that are used to catch a variety of fish. They can be hand-operated or mechanised when operating in deep waters. They catch one fish at a time and can release unwanted species.</p>
<p>Beach and bone seines are long nets with long ropes on each end which herd fish when dragged or towed. They are hauled over sandy or muddy bottom habitats and the cloud of sediment helps herd the fish into the net. Seines are suspended vertically in the water with floats and weights.</p>	<p>Gillnets are walls of stationary or drifting netting that are almost invisible to fish, so fish species swim right into them. Set, drift and trammel gillnets use different configurations of floats and weights to suspend the netting more or less vertically. If gillnets are set deeper they are less likely to trap marine animals like turtles.</p>

Aquaculture methods includes **pens** which are structures which hold farmed fish in open water as they grow. They are made with wooden, mesh or net screens which allow water to flow freely through them

Aquaculture methods includes **ponds** which enclose fish and crustaceans in a coastal or inland body of fresh or saltwater. Historically, ponds were built along the coast and contributed to the destruction of mangrove forests. Pond systems can be 'open', discharging water without treatment or otherwise 'closed,' meaning the water in the ponds is kept, treated and used for multiple purposes.

Source: <https://www.seafoodwatch.org/ocean-issues/fishing-and-farming-methods>

Strand 7: Marine Environment
Unit 7: Sustainable Oceans
Topic 3: Impact of Climate Change on the Oceans

Activity 21: Ocean Action Role-Play

Purpose: Exploring the impact of climate change on the oceans, the consequences for different groups of people and ways of adapting to these changes.

Time needed: 150 minutes (40 minutes for stage one, 65 minutes for stage two and 45 minutes for stage three)

Resources needed

- Pens and paper
- Copies of *Climate Change and the Oceans* handout, one per pair
- Sheets of chart/poster paper and colour markers

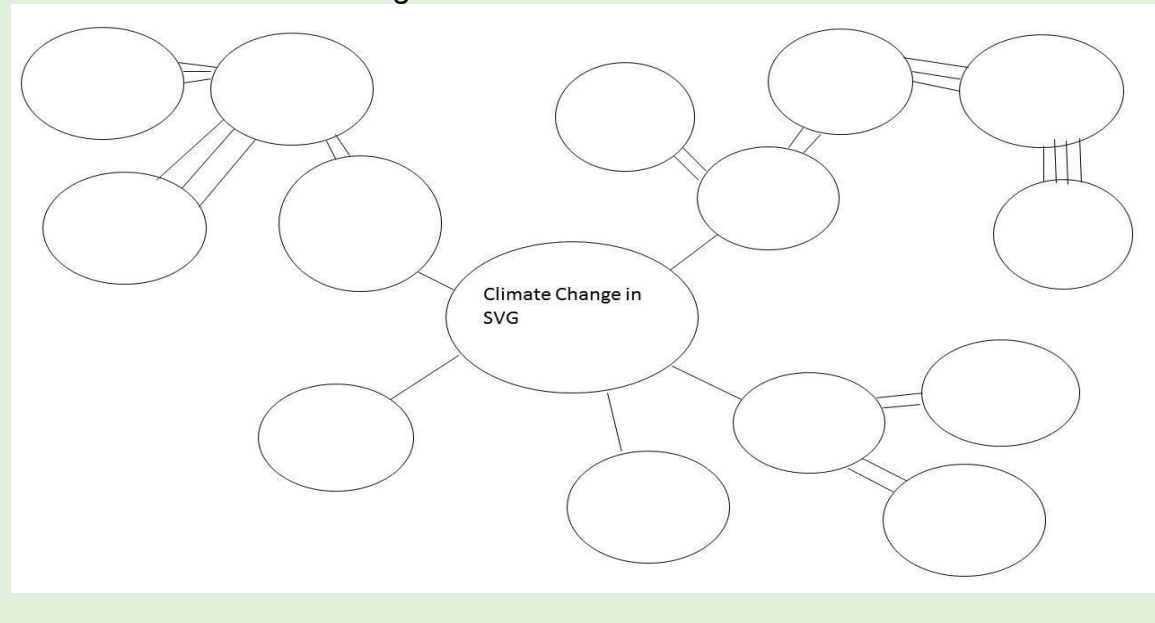
Procedure

Stage 1

Step 1: Have students brainstorm what they know about the impact of climate change on the oceans and write this up on the board or a sheet of flip chart paper. Give out the *Climate Change and the Oceans* handout and read through this as a class. Discuss any information in the handout that surprises students. (20 minutes)

Step 2: Divide the class into eight groups and ensure all groups have pens and paper. Remind students of the *Futures Wheel Diagram* they will have come across earlier by drawing an example on flip chart paper or the board and recall the futures wheel activity process as one of exploring first-, second, third-, fourth- and, possible, fifth-order consequences of an issue event or trend (*Box 15*). Ask groups to write the words 'Impact of Climate Change on the Oceans' in the sheet's center and draw a circle around the words. Ask groups to consider likely concrete effects of climate change on the oceans. Draw single lines radiating out from the central circle, write in each of the effects they have thought of, and draw a circle around each. Next, have them consider the possible repercussions of the first set of consequences (the first-order consequences). This time they draw double lines radiating out to one or more second-order consequences arising from each first-order consequence. Encourage them to go on and write in and circle third-, fourth- and even fifth-order consequences. Encourage them to connect consequences using two-way arrows. (10 minutes)

Box 15: Futures Wheel Diagram



Step 3: Come together as a whole class and invite the groups to share their ideas on the consequences of climate change on the oceans. Write these consequences on the board or flip chart paper. Encourage students to share their feelings and concerns regarding these consequences. (10 minutes)

Stage 2

Step 1: Ask students to review the consequences of climate change on the oceans, listed on the board or flip chart paper. Have students brainstorm the different groups of people in their community who will be affected by these consequences. Ask the class to return to their eight groups. Give each group one of the following roles: (1) national policymakers; (2) coastal managers; (3) local tourism officers; (4) community members; (5) members of the local fishery association (6) environmental NGO officers; (7) local business leaders; (8) marine biologists at university. Revisiting their *Climate Change and the Oceans* handout and their *Futures Wheel Diagram*, ask each group to prepare presentations of four to five minutes for an upcoming local town hall meeting where the new local action plan to respond to the impacts of climate change on the oceans will be discussed. Ask each group to consider and address the following points:

- Their current interest in and understanding of the issues;
- The importance of the oceans for their own work/life;
- The implications of climate change for their own work/life;
- The implications of the threats to the coral reefs;
- The implications of rising sea levels;
- What they can do to respond to these threats and changes. (35 minutes)

Step 2: Encourage each group to make their presentation as real as possible by conducting research, using real examples, mapping recent and projected climate-induced changes. If possible, as homework or by inviting in guest speakers, encourage them to conduct interviews with relevant stakeholders. Ask them to

prepare illustrations, posters and anecdotes to make their presentation attractive. (30 minutes)

Stage 3

Step 1: Return to the activity when groups have prepared. Playing the role of local meeting chairperson, convene a meeting, introduce the groups represented, and invite each group in role to present their perspectives and proposals. Acting as chairperson facilitates a discussion around the development of the local action plan. (30 minutes)

Step 2: Debrief on the role-play, allowing each student to share reflections and feelings about the activity and their learning. (15 minutes)

Variation

After *Stage 3 Step 2*, invite a few real stakeholders representing some of the eight roles used in the role play and give space for students to have discussions with them coming out of the role, or ask them to provide feedback on what they have heard.

Potential/Facilitation Tips

This activity offers an engaging opportunity for students to consider the complex and varied ways in which climate change impacts the oceans and the local implications of these impacts. In the discussion, as part of the role play, encourage students to explore:

- What would constitute effective immediate, mid-term and long-term actions in this community?
- What would constitute effective local, regional, national and international collaborative actions?
- How will you maintain local industries and livelihoods heavily dependent on a healthy marine environment if all your proposed actions fail?

Having students step out of role, ask:

- What would be the key challenges and obstacles to developing and implementing a mutually agreed action plan in a real-life situation?
- Would the voices of different stakeholders be treated equally in real life? If not, what should be done to give equal voice to all?

This activity could take place over two or three lessons and involve the students conducting interviews as a homework activity.

Curriculum Links

This activity falls under the Form 3 Social Sciences theme of 'Places,' under which the achievement indicators include examining the impact of global warming as a climatic phenomenon.' It also compliments Form 3 English: in particular Learning Objective 2 'communicate to send and receive information' under which the

achievement indicators include 'orally express information in a logical sequence' and 'express ideas clearly and fluently'.

Source: Adapted from Selby and Kagawa (2014). Disaster Risk Reduction Education Toolkit. (St Michael: CDEMA)

Handout: Climate Change and the Oceans

Higher temperatures

Rising greenhouse gas emissions are warming the atmosphere and, as a result, increasing sea surface temperatures. This effects marine life in numerous ways. Warmer waters cause coral bleaching, which in turn impacts coral reef ecosystems that are home to most of the ocean's biodiversity - and provide crucial sources of food for people. Warmer waters also threaten to cause mass migration of marine species in search of the right conditions for feeding and spawning. The change in water temperatures can also directly affect the development and growth of most fish and cephalopods (such as octopus and squid). For the 3 billion people worldwide who rely on fish as their chief source of protein, the prospect of fewer and smaller fish in the sea is bad news.

Rising sea levels

Climate change poses a dual threat to sea levels. For one, when land-based polar ice melts, it finds its way to the sea. Second, when water warms, it expands to take up more space. Ten-percent of the world's human population lives at or below 10 meters (32 feet) above sea level and are therefore directly threatened by sea-level rise. Small island nations, like those in the Caribbean, are particularly threatened by rising sea-levels, including the low-lying coasts of SVG. The survival of coral reefs, mangroves, sea grasses and other critical habitat-forming species hinges on their ability to move into shallower waters. Slow-growing species are most unlikely to be able to keep pace with the rising sea level. Critical coastal habitats, like sea turtle nesting beaches, are lost as the sea level rises. Natural and man-made barriers such as cliffs, sea walls, and coastal developments stand in the way of migrating further inland.

Changing Currents

Climate change impacts ocean temperatures as well as wind patterns - taken together, these can alter oceanic currents. Many marine species' migratory patterns can change as the currents they follow are altered. And many species that depend on ocean currents for reproduction and nutrients will be affected. For example, many reef-building coral and reef fish species rely on dispersal of their larvae by currents. The impacts of changes in ocean currents on humanity could be severe, as currents play a major role in maintaining Earth's climate. Changing these currents will have major implications for the climate across the globe, including changes in rainfall, with more rain in some areas and much less in others, and also for air temperatures. These changes have drastic implications for countless species, including humans.

Ocean Acidification

The same burning of fossil fuels that increases greenhouse gas levels in the atmosphere, is also altering the chemical composition of seawater, making it more acidic. The ocean absorbs 30 percent of the carbon dioxide in the atmosphere; when that carbon dissolves into the water, it forms carbonic acid. Acidification directly impacts on ocean creatures that build shells of calcium carbonate such as corals, scallops, lobsters and crabs, and some microscopic plankton that are a foundation of the food web throughout the ocean. These shell-forming organisms provide critical habitats and food sources for other organisms. Increased acidification can also limit

the ability of certain fish to detect their predators which disrupts the food chain. The disruption and destruction of coral reefs and shellfish will have profound effects on humanity, chiefly in the form of less food for people who rely on the ocean for it. If local and global threats to coral reefs are left unchecked, the percentage of threatened reefs will increase to more than 90 percent by 2030 and to nearly all reefs by 2050.

Impacts to St. Vincent and the Grenadines

In SVG marine and coastal environments are particularly vulnerable to the impacts of climate change through factors such as rising temperatures, ocean acidification and sea-level rise. Across the Caribbean the sea level is expected to rise by between 0.17 m and 0.24 m by 2050. This is likely to lead to greater coastal flooding and damage to shorelines and infrastructure from storm surge. In SVG, 85 percent of the population live on a narrow coastal strip less than 5m above sea level. Additionally, 80 percent of SVG total infrastructure, including fish landing sites, fish markets, roads, telephone and electricity lines, water lines, airports, homes and hotels, is located in the coastal zone and therefore at risk. The reefs, which provide critical habitat for many species of fish are already being affected by rising sea surface temperatures which lead to coral bleaching. This has impacts not only on the tourism sector as dive sites become degraded but the livelihoods of many fishermen. Additionally, sand mining on beaches (a source of fine aggregate used in building construction) has increased the country's vulnerability to coastal flooding, erosion and storm surge.

Sources: <https://www.conservation.org/blog/5-ways-that-climate-change-affects-the-ocean>
http://www.wri.org/sites/default/files/Reefs_at_Risk_Key_Findings.pdf cont'd 142
https://www.climateinvestmentfunds.org/sites/cif_enc/files/ST_vincent's_Phase_1_proposal_report.pdf
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/769188/Commonwealth_Marine_Economies_Programme_-_Saint_Vincent_and_the_Grenadines_Country_review.pdf

Strand 8: Land Environment

Unit 8: Sustaining Our Land

Topic 1: Sense of Place: How Land Shapes Culture and Identity in SVG

Activity 22: My Place Then, Now and in Time to Come: How Place Shapes Us

Purpose: Understanding how elder members remember places or locality of the community and how it has shaped them; obtaining a sense of how place or locality has changed and of what has been gained and what has been lost; thinking about what might happen to place or locality in the future and how this will affect subsequent generations; thinking about how to preserve what is valuable in place or locality

Time needed: 130 minutes (following preparation time out of class to collect data for the lesson)

Resources needed

- *Guiding Interview Question* handout per student
- Notepad and pencils
- Recorder for each pair of students
- Flipchart paper and markers

Procedure

Step 1: A week before the lesson, ask students to join in pairs and go out into the neighborhood to interview an elder community member about a favorite place from their childhood, asking questions from the *Guiding Interview Question* handout.

Step 2: Have pairs recount in turn what they have learnt from their chosen interviewee, ending their presentation by sharing the key insights they have gained from the interview. Note down those key insights on flipchart paper. End the lesson with a short discussion (revisit it later) – of what the exercise reveals about the human experience in the modern world. (50 minutes)

Step 3: In the next lesson, allot some time for pairs who have not yet shared their interview. Then trigger a whole-group discussion of what the exercise tells us about how place shapes who we are and about the modern human experience and why environmentalism has become such a powerful movement in today's world. [Refer back to the flipchart notes.] (30 minutes)

At an appropriate point in the discussion, ask students to quietly think about a local place that is meaningful to them. Then throw the question: How would you feel in your later years if the place had gone? After a sharing of chosen places and feelings, turn the discussion to ask what could and should be done by individuals and by communities to preserve those unique places. (50 minutes)

Variation

Have pairs accompany elders on a guided tour of favorite places in the locality that have been lost (the elders could share their photographs of those places from back in their childhood or earlier days). Have the students take photographs, make sketches and keep a written record of what the elder recounts as they visit places. Back in school, have pairs share what they have experienced and have the class mount a display of photographs, sketches and writing in a public place where students and staff congregate.

Extension

Have class members compose and recite poems based on what they have learned.

Potential/Facilitation Tips

This activity can be a powerful way of helping students understand a common human experience of the modern age, the experience of loss of place that mattered to us and shaped us, especially nature in that place. Explain at an appropriate point in the discussion that loss of a loved place - or fear of loved place being lost - more than anything else lies behind the modern environmental movement. Ask the class to reflect on the presentations and how frequently there was a reference to the loss of natural environment. Make clear that the last question asked under *Step 3* – concerning what could and should be done to preserve place – is precisely the question environmentalists are asking themselves.

For activities outside of the school (*Step 1* and *Variation*), ensure permission is obtained from the principal and school authorities, parents or guardians give consent for a visit, and agreement is secured from some parents and community members to help with the activities.

Curriculum Links

This activity marries with the Form 3 Social Sciences 'Environment' theme, where conservation measures are studied. It also supports learning falling under the 'Listening and Speaking' section of Form 3 English curriculum, where Learning Outcome 1, Achievement Indicators 12 and 13 call for the conducting of short interviews and Learning Indicator 4, Achievement Indicator 9 opens space for the discussions of goals, dreams and aspirations for a sustainable future.

Handout: Guiding Interview Questions

Where was your favorite place during childhood?

What kind of place was it?

Why did you like it?

Why was it so meaningful to you?

How did it influence what you became?

What do you especially remember about it?

[When you have obtained a mental picture and/or seen a photograph of the place as it was and its childhood significance for the person you are interviewing, move on to the following questions.]

Is the place the same? If not, how has it changed?

Are some things you recall still recognizable? Has it kept or lost the meaning it had for you as a child? Is it noisier, quieter, or the same? Is it more crowded, less crowded, or the same?

Strand 8: Land Environment
Unit 8: Sustaining Our Land
Topic 2: Organizations that Protect the Land

Activity 23: Motivation, Communication, Liberation, Education, Transformation: NGOs at Work

Purpose: Exploring, analyzing, comparing and contrasting two Union Island-based environmental organizations, their philosophy, projects, reach and impacts

Time needed: 95 minutes

Resources needed

- Two sheets of chart paper and a few markers for each group of four students
- Access to the Internet for each group (to enable group Internet search)

Procedure

Step 1: Explain to the class that they will explore and analyze two non-governmental (NGO) environmental/sustainability organizations based on Union Island through the medium of the Internet. Remind them that an NGO is typically a non-profit, citizenship-based group operating independently of government. Invite students to join up in groups of four and sit around a computer terminal as a four. Ask groups to prepare two quadrant-style charts with quadrant titles, as in *Box 16*. Explain that you will take the class on a journey into each of the two NGOs through the Internet. Say, too, that after each part of the journey, you will ask them to note what they have learned according to the four-quadrant headings. They are to use one chart per NGO. (5 minutes)

Box 16

Origins/Philosophy	Aims/Objectives
Activities/Projects	Effects/Impacts

Step 2: Begin the Internet tour of Sustainable Grenadines (SusGren) by having the class read its homepage introduction and the summary of its program areas: <http://www.susgren.org> They should also look through the gallery of photographs in the program section. Then have groups decide what they have learned about the organization under each quadrant and write up notes. (15 minutes).

Step 3: Next, have groups watch the YouTube video on SusGren's *Connecting Kids with Nature Project*: <https://www.youtube.com/watch?v=WOVINcmoiQ0> (7 minutes 20 seconds), and take a look at the write-ups of other SusGren projects such as the Ashton Lagoon Restoration Project and the Caribbean Marine Biodiversity Program: <http://www.susgren.org/projects/8>. Then have groups decide what new things they have learned about SusGren, adding the new learning in the appropriate chart quadrant. (20 minutes)

Step 4: Turn attention to the Union Island Environmental Attackers NGO and have groups explore the *About Us* website page: <http://environmentalattackers.org/about/> They should also view the video clip and listen to the Attackers' song on the same page [the song in its refrain uses the words used in the title of this activity]. Have them write notes in each of the four quadrants of their second chart on what they have learned about the organization. (20 minutes)

Step 5: Next, have groups watch an Environmental Attackers' video and read the accompanying text: <https://ensia.com/videos/the-environmental-attackers/>(3:50 minutes). Follow this by having groups write further entries in the four quadrants. (15 minutes)

Step 6: Bring the class together to discuss what they have seen and written. First, give space for feedback on what has been discovered about SusGren. Follow this with feedback on the Environmental Attackers. Then pose two related questions. First, ask what has been learnt about environmental NGOs in general? Second, ask what differences in style, approach, and philosophy students found between the two organizations reviewed? (20 minutes)

Variation

The length of time given over to the activity can be shortened by asking students to read and view some of the material as homework, but it is optimal to take the class through the watching/reading/listening experience together.

Potential/Facilitation Tips

Some of the website texts are quite dense, so it is good to help groups identify the sections of text on which they should focus. During *Step 6*, have students think about key characteristics of NGOs, such as the levels of community involvement and volunteerism. Also, help students tease out the differences in approach, scope, aims and philosophy by giving examples on which they can build. Encourage students to form similar groups in school or join existing ones in the community if they are eligible. The activity can easily be spread over two lessons.

Curriculum Links

This activity can be linked to the 'Earth's Resources' theme of the Earth Science strand of Form 3 Integrated Science and Technology with its emphasis on human use of natural resources: also, the Form 3 Social Sciences 'Environment' theme where conservation and conservation measures are to be studied. The Form 3 'Man-Made Systems (Regional)' sub-section of the Geography curriculum with its focus on vegetative types also opens the way for consideration of biodiversity and conservation

Strand 8: Land Environment
Unit 8: Sustaining Our Land
Topic 3: SVG and Sustainable Development Goals

Activity 24: Life on Land

Purpose: Considering steps to be taken by St Vincent and the Grenadines in pursuit of Sustainable Development Goal, SDG 15 *Life on Land*

Time needed: 65 minutes

Resources needed

- Enough copies of the *UN Sustainable Development Goals* handout so there is a copy for each group of four
- One cut-up set of *SDG 15, Life on Land, Targets* (one *Target* needed per group of four)
- Chart paper and markers for each group
- Availability of past stick for groups to share
- Internet access to the UN SDG *Knowledge Platform* on SDG 15: <https://sustainabledevelopment.un.org/sdg15>

Procedure

Step 1: Remind the class that the Sustainable Development Goals (SDGs) are a collection of 17 global goals set down by the United Nations General Assembly in 2015 to be achieved by 2030. Have students form groups of four and have them go through and discuss the *UN Sustainable Development Goals* handout. Invite questions and requests for clarification from the class. Explain that the Goals each have a list of *Targets* attached to them; that is, specific, concrete things to be achieved where the achievement is measurable. Say that the following activity focuses on one SDG, *Life on Land*, and its targets as they apply to SVG. (15 minutes)

Step 2: Draw the class's attention to the text of SDG 15 and invite groups to think for a few moments about the implications of the text for SVG. Then conduct a brainstorm of ideas, writing them on the board. (5 minutes)

Step 3: Hand out a sheet of chart paper and markers to each group together with *one of the SDG 15 Targets*. Explain that each group's task is to think through the implications for SVG if the country is to realize that target by 2030 and, in some cases, 2020. They paste the *Target* in the center of their chart paper and write in ideas and questions around the *Target*. Emphasize that they should think of:

- Practical things that the national government could do, local authorities, community groups, families, individuals, young people
- Ways in which progress could be monitored and who would monitor it

- How people would know with some certainty that a target had been achieved (what the UN calls an 'indicator'), i.e., how success in meeting the targets could be measured
- Ways in which developments towards the *Target* could be best communicated and widely communicated.

(20 minutes)

Step 4: Have groups form a 'UN circle,' i.e., a circle of groups, and one by one present their ideas. After each group presentation, encourage points and questions from other groups. Follow the presentations by having the class consider questions such as the realism of ideas proposed, how meeting the *Targets* could best be made viable, how to build national and community consciousness, and how realistic the monitoring processes and indicators suggested are. (25 minutes)

Extension

Think of using the same process for the other 16 Sustainable Development Goals.

Potential/Facilitation Tips

As necessary, assist students in understanding any unfamiliar terminology used in the *SDG Targets*; for instance, the difference between 'afforestation' and 'reforestation' and terms such as 'degradation-neutral' and 'priority target species.'

You might bring the class's attention to the *SDG Knowledge Platform* and especially the page for *SDSG 15* where the original *Targets* are laid out and where indicators for each *Target* are given. The class might like to compare and contrast their suggested *SVG*-related targets with those set out in the UN text! For the *Knowledge Platform* page, go to: <https://sustainabledevelopment.un.org/sdg15>

Curriculum Links

This activity Complements the 'Production' theme in Form 3 Social Sciences, which calls for students to demonstrate an understanding of the impact of land use; the achievement indicators include discussing the importance of sustainable development and sustaining land as a natural resource for the future.

Handout: UN Sustainable Development Goals (SDGs)

<p>1 NO POVERTY</p>  <p>End poverty in all forms everywhere.</p>	<p>2 ZERO HUNGER</p>  <p>End hunger, achieve food security and improved nutrition and promote sustainable agriculture</p>	<p>3 GOOD HEALTH AND WELL-BEING</p>  <p>Ensure healthy lives and promote well-being for all at all ages</p>
<p>4 QUALITY EDUCATION</p>  <p>Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all</p>	<p>5 GENDER EQUALITY</p>  <p>Achieve gender equality and empower all women and girls</p>	<p>6 CLEAN WATER AND SANITATION</p>  <p>Ensure availability and sustainable management of water and sanitation for all</p>

**7 AFFORDABLE AND
CLEAN ENERGY**



Ensure access to affordable, reliable, sustainable and modern energy for all

**8 DECENT WORK AND
ECONOMIC GROWTH**



Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

**9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE**



Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

**10 REDUCED
INEQUALITIES**



Reduce inequality within and among countries

**11 SUSTAINABLE CITIES
AND COMMUNITIES**



Make cities and human settlements inclusive, safe, resilient and sustainable

**12 RESPONSIBLE
CONSUMPTION
AND PRODUCTION**



Ensure sustainable consumption and production patterns

13 CLIMATE ACTION



The urgent action to combat climate change and its impacts

14 LIFE BELOW WATER



Conserve and sustainably use the oceans, seas and marine resources for sustainable development

15 LIFE ON LAND



Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

16 PEACE, JUSTICE AND STRONG INSTITUTIONS



Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

17 PARTNERSHIPS FOR THE GOALS



Strengthen the means of implementation and revitalize the global partnership for sustainable development

Handout: SDG 15, Life on Land, Targets

Target 1

Combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world.

Target 2

Ensure the conservation, restoration and sustainable use of freshwater ecosystems and their services, particularly forests, wetlands, mountains and dry lands.

Target 3

Promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally.

Target 4

Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and prevent the extinction of threatened species.

Target 5

Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both the demand and supply of illegal wildlife products.

Target 6

Introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on lands and water ecosystems and control or eradicate priority target species.

Target 7

Integrate the protection of ecosystems and biodiversity into national and local planning, development process and poverty reduction strategies.

Target 8

Ensure the conservation of mountain ecosystems, including their biodiversity, in order to improve their capacity to help sustainable development.

Strand 9: Ecosystem and Biodiversity Threats

Unit 9: Conservation Measures and Effects

Topic 1: Intrinsic and instrumental valuing of nature as springboards for conservation

Activity 25: I Value Nature Because...

Purpose: Introducing the concepts of *intrinsic valuing* and *instrumental valuing of nature* and considering them as motivations for environmental action for nature conservation and biodiversity protection.

Time needed: 110 minutes (60 minutes for *Stage 1*; 50 minutes for *Stage 2*)

Resources needed

- Copy of the 'I value...' questionnaire per student
- Access to the Internet to view the *Intrinsic and Instrumental Values* video (2 minutes 35 seconds): <https://www.khanacademy.org/partner-content/wiphi/wiphi-critical-thinking/wiphi-fundamentals/v/intrinsic-extrinsic-value>
- Cut-up set of *Reasons for Valuing Nature* statements for each group of six
- Copy per student of the *Valuing Nature* reading
- Chart paper and marker for each group of six

Procedure

Stage 1

Step 1: Distribute the questionnaire to the class and ask students quietly and without conversation to complete the eight-section questionnaire. Explain that they should write in something they value, love, or hold very dear in the left-hand column and then briefly explain why they value it in the right-hand space. Use the pre-added 'money' section as an example of completing the questionnaire. (10 minutes)

Step 2: Have students join together in groups of six to share some of their answers. Explain that their job is not to discuss particular answers but to see if they can discern different types of or reasons for valuing behind the answers. (10 minutes)

Step 3: Have groups report back as a trigger for a whole-class discussion of reasons for valuing things, using the board to make a 'map' of reasons that are identified. As the discussion peters out, summarize what has been said, drawing, as necessary, on information in *Box 17* to explain the concepts of *intrinsic value* and *instrumental value* (they may well have emerged to some extent from the discussion). Have the class view the short video explaining the intrinsic and instrumental value and afterward give space for questions and requests for clarification. (20 minutes)

Box 17: Intrinsic and Instrumental Valuing

Why do we value things? When we value something because it helps us get or achieve something we desire we give it *instrumental value*; that is, we treat it as an

instrument or *means* for getting something important we want to obtain or achieve. It is not an end-goal in itself but a means by which some more important goal can be achieved.

When we value something in its own right and for its own sake we say it has *intrinsic value* (i.e. value in and of itself regardless of possible usefulness). Examples often given of attributes held to be of intrinsic value include: love, friendship, wisdom, pleasure, beauty, health and life.

Money is a case in point. We value money not in its own right but for important benefits it can bring. It has instrumental value. It is a means to an end, helping us buy things that fundamentally matter to us. We can use money to buy medicine for your health and wellbeing, for instance, attributes that are valuable in their own right.

Things can have *both* intrinsic and instrumental value. Health is intrinsically valuable but it also important, instrumentally, for achieving lots of other things we value such as an active life, happiness, the ability to make a difference. So the two forms valuing are not necessarily mutually exclusive. We can value a garden for its beauty but also as a source of food.

Step 4: Distribute a set of Reasons for Valuing Nature statements to the same groups of six. Have groups consider whether the statements suggest an *instrumental valuing* of nature or an *intrinsic valuing* of nature. Have them sort the statements into three piles or clusters, i.e., an intrinsic valuing cluster, an instrumental valuing cluster, and a 'both' cluster. Then bring the class together and go through the statements one by one, discussing the valuing represented by each card. Close by raising the question of whether an *intrinsic valuing of nature* or an *instrumental valuing of nature* is likely to prove more *motivational* in efforts to conserve nature and protect biodiversity. Distribute the *Valuing of Nature* handout and ask the class to read and think about the question ahead of the next lesson. (20 minutes)

Stage 2

Step 1: When the class next convenes, ask the groups of six to re-form to share their thoughts on the relative motivational power of the two forms of valuing. Which is more likely to help the conservation cause, or are both important? Give each group a sheet of chart paper to capture their arguments, agreements and disagreements on the question. (20 minutes)

Step 2: Invite each group to share their discussions, giving space after each group presentation for others in the class to comment and ask questions. End by asking the class to keep their understanding of intrinsic and instrumental valuing in mind as they next come to look at the SVG biodiversity plans. (30 minutes)

Potential/Facilitation Tips

This activity opens up the question of forms of valuing nature and how helpful they are in promoting nature conservation and action to curtail biodiversity loss. Another way to illustrate *instrumental valuing* is to talk of conservationists who speak of nature as a *resource*, i.e., something for humans to use. There is often talk of natural resources rather than nature in sustainability discourse. In sustainability, thinking nature is also described as *ecosystem services*, i.e., nature as offering a service to human beings. All such descriptions are *anthropocentric*, i.e., human-centered, putting the human being at the core of everything.

On the other hand, intrinsic valuing is *bio-centric* or *eco-centric*, i.e., putting nature at the core of everything (humans being part of nature). Add these terms and concepts to the class discussion at appropriate points to become familiar to students. In the final discussion, (*Step 2 of Stage 2*) focus upon the critical questions asked in the handout: ‘we say we believe nature has intrinsic value; from that belief, what follows? What arguments do we use? What tactics do we deploy?’ Ask students for their ideas about ensuring that intrinsic valuing has a greater voice and prominence. How will they address a global consumer society underpinned by disrespect for nature or, at best, an instrumental valuing of nature?

In preparing to facilitate this activity, re-read *Case Study 15, Biodiversity Loss and Conservation on SVG* in the *Resource Manual*.

Curriculum Links

This activity aligns with the ‘Environment’ theme in Form 3 Social Sciences, under which the concept of conservation is explained to students and different conservation methods are studied.

Source: The *Valuing of Nature* reading draws from and is in part inspired by the following essay: Nelson, Bruskotter & Vucetich, *Does nature have value beyond what it provides humans?* October 2015.

<http://theconversation.com/does-nature-have-value-beyond-what-it-provides-humans-47825>

Handout: 'I value...' Questionnaire

I value money	because.....
I value	because.....
I value	because.....
I value	because.....
I value	because.....
I value	because.....
I value	because.....
I value	because.....
I value	because.....

Reasons for Valuing Nature

<p>Tropical Rainforests (1)</p> <p>The tropical rainforests should be conserved because they may contain plants that give us new medicines for combatting disease.</p>	<p>Spiritual Sense</p> <p>Preserving wild places is essential. When I am in them, I feel a spiritual sense of the oneness and beauty of the Earth.</p>
<p>Look after the Bees (1)</p> <p>We must take care of bees and other pollinators of fruit trees to help ensure we have a continuing supply of important food.</p>	<p>Look after the Bees (2)</p> <p>Bees give us a magnificent example of what a community of beings living in harmony and working in cooperation can look like, an example we might follow.</p>
<p>Tropical Rainforests (2)</p> <p>The tropical rainforests are the lungs of the Earth, giving us a never-ending supply of oxygen. It is also vital that we conserve them to slow climate change as they soak up and store carbon dioxide.</p>	<p>Coral Reefs</p> <p>To snorkel on a coral reef is to see a world of indescribable, awe-inspiring beauty, a world teeming with life.</p>
<p>Sustainability</p> <p>We need to ensure that we live within the boundaries of the Earth's resources so that what we call ecosystem services – the food and resources nature provides - can sustain human life into the future.</p>	<p>Orchid</p> <p>I look at an orchid in the forest and see a living being of great beauty that is there for itself, not for me, and has been there for millions of years and, if left alone, will be there for centuries to come.</p>
<p>Recreation</p> <p>Ensuring that humans have nature reserves to visit is good for their health, recreation and relaxation. It is time away from the hustle and bustle of everyday life.</p>	<p>Poetry</p> <p>How could our poets write poetry and our composers make music without a flourishing world of green to inspire them?</p>

Handout: Valuing Nature

You can drive a nail with a hammer and pull one. With a pencil, you can write a poem or a song. Hammers and pencils are useful – instrumentally valuable, that is. But if the pencil snaps or the hammer cracks, then they are off to the trash heap.

What about the intrinsic value of nature? Does nature have only pencil- and hammer-like values, or does nature also possess intrinsic value?

Many nature conservationists, including some well-known ones, say that the best way of conserving nature is to stress its instrumental value. People won't protect nature, they say, unless they appreciate its 'ecosystem services,' that is, the services nature provides for us humans, such as renewing oxygen, pollinating flowers, so crops grow, taking carbon out of the atmosphere and so reducing climate change. They belittle, even scorn, appeals for conservation based on the intrinsic value of nature as ineffectual. Nobody will listen, they say.

Some conservationists even say that the way to conserve nature is by putting a dollar value on everything. They argue that if those working in conservation can put a financial value on a forest, then a government will more likely listen and think again about allowing loggers to chop it down. Self-interest will promote conservation.

They assume that only by appealing to the instrumental value of nature will we motivate environmental action because, they think, that's how humans value nature. We are, that is, anthropocentric (from the Greek, meaning human-centered). Everyone knows that, right? As it turns out, not right!

A survey of people in Ohio, USA, hardly a place of tree huggers, found that 82% of residents thought that nature had intrinsic value while 90% of people in the survey who described themselves as 'conservationists' accepted the intrinsic value of nature. This survey suggests that conservationists who reject the intrinsic value of nature are out of touch.

That survey feels right. Most of us who care about nature are awed and motivated by its beauty and wonder, which inspires us to protect nature. I know a natural place intimately and this makes me love and want to protect it

So, maybe we make the mistake of assuming the 'ecosystem services' folk are in the majority. This leads us to let them control the approaches we take to conservation and our beliefs about what kind of conservation message is likely to succeed. We must put an intrinsic value message out there. We invite conservationists and the conservation community to engage in a moment of reflection: we say we believe nature has intrinsic value; from that belief, what follows? What arguments do we use? What tactics do we deploy?

Strand 9: Ecosystem and Biodiversity Threats
Unit 9: Conservation Measures and Effects
Topic 2: SVG Biodiversity Plan

Activity 26: VITAL Biodiversity

Purpose: Familiarizing students with the SVG *National Biodiversity Strategy and Action Plan* and having students consider and work on ways in which the key messages of the *Strategy* might be effectively conveyed to the SVG population.

Time needed: 55 minutes for the launch lesson (*Stage 1*); an indeterminate amount of time for what follows in *Stage 2*.

Resources needed

- Chart paper and markers for launch lesson
- Groups to determine resource needs in light of plans

Procedure

Stage 1

Step 1: Use the information given in *Box 18* to introduce the *National Biodiversity Strategy and Action Plan* to the class. In particular, explain and discuss each of the agreed *National Targets* within the *Plan*. (15 minutes)

Box 18

The *Revised National Biodiversity Strategy and Action Plan (2015-2020)* is the response of the SVG government to the international *Strategic Plan for Biodiversity* and twenty *Biodiversity Targets* established by governments at the Convention of Biological Diversity conference held in Aichi, Japan, in 2010. The *Aichi Targets* are time-bound and are to be achieved by 2020. The five *National Targets* chosen by SVG (and the *Aichi Targets* they are based on) are as follows:

- *National Target 1:* At least 50% of the SVG population is to be knowledgeable about the values of biodiversity and the steps they can take to conserve and relate to it sustainably (*Aichi Target 1*)
- *National Target 2:* SVG will have completed studies to establish the status of all natural habitats and the rate of habitat loss or be in the process of developing a national strategy to reduce habitat loss. (*Aichi Target 5*)
- *National Target 3:* Invasive, alien species and the pathways whereby they enter SVG are to be identified, and, for those species posing a priority threat, control and eradication programs are to be put in place with entry pathways managed. (*Aichi Target 9*)
- *National Target 4:* At least 17% of terrestrial and inland water and 10% of

marine and coastal areas, especially areas of biodiversity and ecosystem value, are to be conserved through connected systems of protected areas and other conservation measures. (Aichi *Target 11*)

- *National Target 5*: Ecosystem resilience and the contribution of biodiversity to carbon storage, through conservation and restoration of habitats, will be enhanced as a contribution to climate change mitigation and adaptation and combatting desertification. (Aichi *Target 15*)

Step 2: Go on to explain that the SVG government makes clear in its *National Biodiversity Strategy* that ‘key messages will be developed in collaboration with key stakeholders’ under the broad heading of *Biodiversity is Vital*: i.e.

Valuable,

Important to sustain life

Threatened (plants, animals, ecosystems)

Actions can be taken to conserve and reduce biodiversity loss

Livelihoods (new and sustainable forms of work)

Write the **Vital** acronym on the board and explain that communicating the messages will be done under a ‘unique brand’ and developed and delivered to ‘best suit the target audience.’ The audience will include the mass media (radio, television, newspapers). There will be direct interaction with stakeholder (including community) groups. The Internet will be used as ‘a repository for public education’. Invite questions from the class. (10 minutes)

Step 3: Divide the class into five groups, a **V** group, an **I** group, a **T** group, an **A** group and an **L** group. Explain that their task is to agree on and develop ways of communicating key biodiversity messages related to the five national biodiversity targets under their given heading. They may choose to: create a poster display; plan a radio program and seek to broadcast it; do some street or community theatre to promote biodiversity; prepare a musical (song and dance) event; choose to perform with slides in front of the whole school and parents. Urge groups to ‘think big’ and be ambitious! [Encourage them, too, to let the Sustainable Development Unit of the Ministry of Finance, Economic Planning and Sustainable Development – the body overseeing actions under the *National Biodiversity Strategy* - know of what they are doing.] Give the rest of the lesson time over to initial group planning. (25-30 minutes)

Stage 2

Step 1: Give occasional classroom time and homework time over the next few weeks for preparing to communicate using the media they have chosen. Then arrange for the various presentations, performances and displays to be held on or around 22 May, the International Day for Biological Diversity (<https://www.cbd.int/idb/>) inviting

parents, teachers, community, stakeholders and members of the Sustainable Development Unit to the events.

Step 2: After the events, hold a class debriefing on the experience, what has been learnt from the event, what impact their presentations, performances and displays have had, and what they might do differently next time to achieve a broader and deeper impact.

Potential/Facilitation Tips

A crucial role of the teacher in this activity is to help groups with resources and with making contact with individuals, bodies and organizations, they wish to involve in their plans (for instance, headteacher, primary schools, local mayor, community groups, local radio, the Sustainable Development Unit). It is thus essential to have to hand in advance contact details of those likely to be called upon by students.

A second key role is to monitor and offer mature advice on group plans, project development, and project implementation and advise on event publicity and effective dissemination of plans.

In preparing to facilitate this activity, re-read *Case Study 15, Biodiversity Loss and Conservation on St. Vincent and the Grenadines* in the *Resource Manual*.

Curriculum Links

This activity aligns with the 'Environment' theme in Form 3 Social Sciences, under which the concept of conservation is explained to students and different conservation methods are studied. According to student project choice, it can also connect with Visual Arts, Drama, Dance and Music learning outcomes and achievement indicators. In Music, the 'Participating and Collaborating' theme in Form 3 calls on students to compose rhythmic and melodic pieces. The Visual Arts curricular theme of 'Participating and Collaborating' invites group work on an environmental project, while the theme of 'Creating, Interpreting and Presenting' calls on students to demonstrate research skills for an art and design project.

Strand 9: Ecosystem and Biodiversity Threats

Unit 9: Conservation Measures and Effects

Topic 3: Developing and implementing a small scale action project for biodiversity

Activity 27: Giving Nature a Home at School

Purpose: Engaging students in a small-scale biodiversity project through designing and implementing a school biodiversity action plan

Time needed: 50 minutes for *Stage 1*; an indeterminate amount of class and out-of-school time for *Stages 2* and *3*.

Resources needed

- Chart paper for *Stage 1*
- Chart paper and other materials, as called upon, for *Stage 2*

Procedure

Stage 1: Survey

Step 1: Explain to the class that nature is all around us. It is not just something 'out there' but in our homes and gardens. Ask the class for examples of wildlife they have come across at home. Explain, too, that around the world, people are benefiting from this by doing as much as they can to give a home to wildlife in their own home and garden. In this way, homes can help protect biodiversity. Say that school can become nature's home, too! Suggest the class designs and implement a biodiversity action plan at school. (10 minutes)

Step 2: Divide the class into groups of five or six and take them outside, each with the job of, first, mapping and identifying the school grounds in terms of homes for nature that are already in place and, second, mapping and identifying places where there are opportunities for natural settings so far been left unexploited. Examples of the former might include gardens, left-alone wild places, trees and planting containers. Examples of the latter might consist of regularly mown lawn areas and areas of tarmac serving no particular purpose that could be used for a re-wilding project, manicured flower gardens that could be made into gardens for indigenous wild plants, walls up which climbing plants could be grown providing nests for wildlife, corners where wildlife refuges could be erected. Have everyone return to class, invite groups to share their maps and, finally, have the class agree upon a composite map. (40 minutes)

Stage 2: Planning

Step 1: Maintaining the same groups, have the students research possibilities by seeking the advice of local naturalists and conservation and biodiversity experts on how to re-wild an area, and by finding out about wildlife-attractive plants for the sites in question, and from where locally they could be sourced (free of charge, preferably,

and not from the wild). Encourage them to enlist the support of adults in the local community, so their muscles and skills are available to the project. Have experts and community members visit the class, if possible. Have the students visit important garden sites such as Montreal Gardens or the Kingstown Botanical Gardens. Crucially have students begin to prepare the case before the head teacher to make the school a biodiversity focal point - see *Potential/Facilitation Tips*. (Some class and homework time over a few weeks)

Step 2: Convene all groups for a whole class session to share what they have discovered and developed ideas. Have students negotiate and write a working plan with sections on (1) why they want to create a home for nature; (2) what they would like to achieve; (3) how they intend to do it; and (4) to what timetable. Arrange for the plan to be presented to the headteacher at a special session. If the headteacher is supportive, have the students present to the school community and a second presentation to the local community. (Class time during a few lessons plus time out of class for the various presentations)

Stage 3: Execution

Step 1: Working to an agreed schedule, have students working with adult members of the community, implement the plan, ensuring that due care is taken to ensure that plants are watered and cared for, especially in the period immediately after planting

Step 2 (ongoing): Have the students maintain a class diary of their efforts and key nature moments resulting from the re-wilding (e.g., returning a long-missed butterfly species to the school site).

Step 3 (ongoing): Establish a monitoring structure and schedule to ensure that the school nature home is maintained, adjustments made, and further initiatives launched as new classes come through.

Potential/Facilitation Tips

Beginning as a class project, this activity expands into a multi-pronged initiative that draws in conservation experts, community members, the headteacher and probably other staff and, very importantly, successive classes of students who will be called upon to take up the baton from the Form 3 initiators once they move up the grades. To ensure continuity, keeping an ongoing diary and establishing a monitoring mechanism (perhaps a biodiversity committee of staff, students and adults in the community) are vital. It is also an excellent idea to let the Sustainable Development Unit responsible for the *SVG National Biodiversity Strategy* (see *Activity 26*) keep abreast of the project and its development. Another point to bear in mind is that it will become an on-site learning resource as the initiative matures. One can imagine the science teacher using the site for botany classes, the English teacher holding a spontaneous poetry writing session amidst the school wildlife garden!

Make sure to run the project idea by the headteacher before commencing. While the activity involves students putting their plans to the headteacher, it is essential to obtain 'in principle' support ahead of broaching the idea with the class.

In preparing to facilitate this activity, re-read *Case Study 15, Biodiversity Loss and Conservation on St. Vincent and the Grenadines*, in the *Resource Manual*.

Curriculum Links

This activity aligns with the 'Environment' theme in Form 3 Social Sciences, under which the concept of conservation is explained to students and different conservation methods are studied. It also connects to the Form 3 Geography theme of 'Man-Made Systems', where attention is given to 'methods of conservation in any Caribbean country.'

Strand 10: Water & Solid Waste

Unit 10: Water Conservation

Topic 1: Disaster/Climate Change Threats to Water Supply

Activity 28: Water's Journey: From Source to Consumer

Purpose: Exploring how the potable water available at home and school in St Vincent is produced; raising awareness of the Central Water and Sewerage Authority (CWSA)'s work in water management and distribution; understanding how CWSA deals with challenges posed by climatological hazards

Time needed: 80 minutes

Resources needed

- A sheet of chart paper and four markers of different colours per group of five
- A video clip, *CWSA –Water Distribution*
<https://www.youtube.com/watch?v=8pPIZGPoWhc> (20.46 minutes)

Procedure

Stage 1

Step 1: Have students form groups of five. Hand a sheet of chart paper and four colour markers to each group. Ask them to write 'raw water' on the left side of the paper and 'portable water at home/school' on the right side of the paper. Explain that raw water includes rainwater, groundwater, water from rivers and lakes, while potable water means safe drinking water. Ask each group to brainstorm how raw water has been processed and transferred to home/school as potable tap water. Using a first colour marker, have students write down their ideas on the sheet adding arrows indicating the sequences. After a few minutes, ask them to consider any obstacles or challenges when water travels from source to consumer. They might want to think of climatic and physical conditions in this regard. Have them write ideas down using a second colour marker. Then ask students to add what they believe the Central Water and Sewerage Authority (CWSA) does in the water supply system using a third colour marker. Have groups write down questions raised during the group work using a fourth colour marker. (15 minutes)

Step 2: Invite each group to share what they have discussed briefly. Write down key points on the board. Give a brief input on CWSA and water processing procedures drawing upon the information in *Box 19*. (15 minutes)

Box 19

- The Central Water and Sewerage Authority (CWSA) is a statutory body under the SVG Ministry of Health, Wellness and the Environment. Its mission is to 'provide its customers with the highest quality water supply, sewerage and solid waste management services in an efficient and affordable manner.'

- CWSA's responsibilities include production and distribution of piped water on St. Vincent

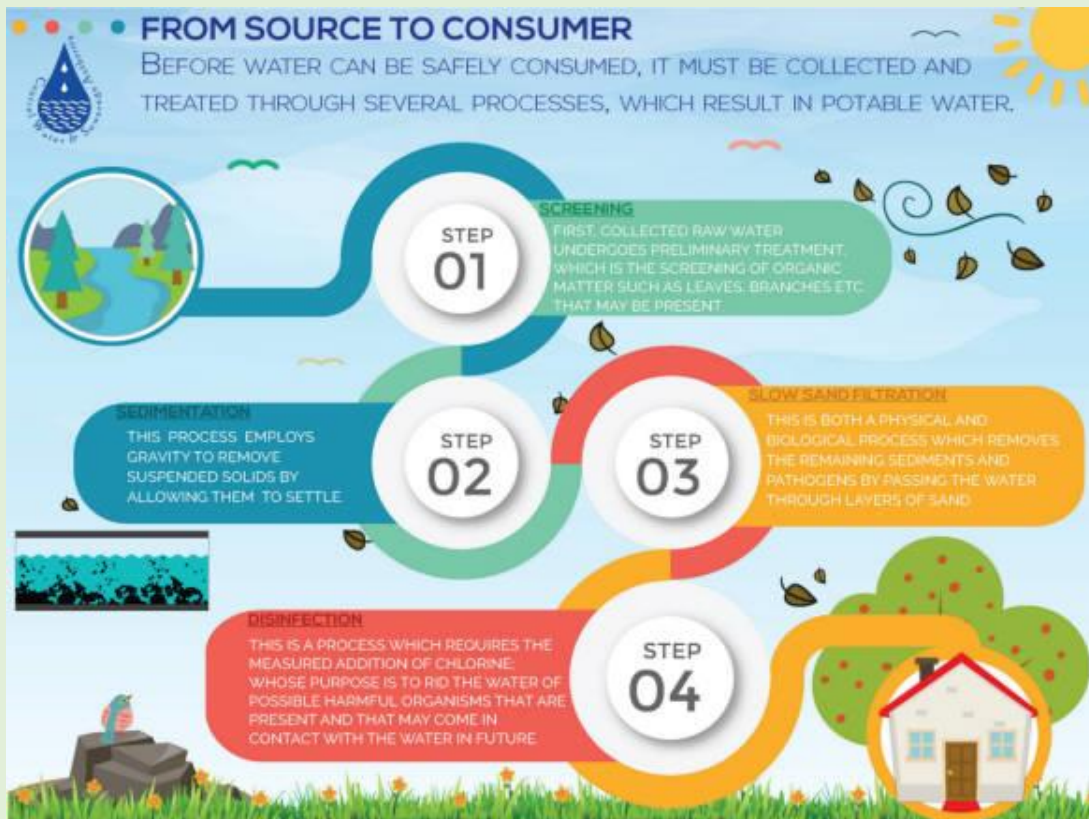


Diagram is taken from CWSA <http://www.cwsasvg.com/newsandpublications.html>

Step 3: Explain to students that they will watch a video clip on CWSA's work in water distribution (including its challenges due to climatological hazards) and then add to and, if necessary, amend what they have written on their chart paper. Show the video clip and have them take notes while watching it. (25 minutes)

Step 4: Have each group update what they have written earlier. Invite each group to give a summary presentation. Then lead a whole-class discussion focusing on the water supply challenges posted by climatic conditions and the responsibilities of consumers. (25 minutes)

Potential/Facilitation Tips

Many students may take potable water at school/home for granted and carelessly use it. This activity helps them understand the enormous efforts made by CWSA in ensuring safe water distribution and the challenges they face due to natural hazards and changing climate. It is essential to discuss the responsibilities of consumers.

The video clip used in *Step 3* is very informative, so avoid providing too much information in *Step 2*. Make sure that students watch the video attentively by taking notes.

This activity also prepares for the CWSA field visit (*Activity 29*). During *Step 4* ask students to come up with a list of questions they would like to put to CWSA personnel they will meet during the field visit.

In preparation for facilitating this activity, read *Case Study 23: Central Water and Sewerage Authority (CWSA)* in the *Resource Manual*.

Curriculum Links

This activity can be aligned with the Earth Science theme of the Form 3 Integrated Science and Technology curriculum, where students are asked to describe the effects of climate change on the human and natural environment. It can also be aligned with the 'Natural Systems (Physical)' part of the Form 3 Geography curriculum, which includes a sub-section on rainfall and Caribbean weather systems exploring the impacts of different weather phenomena.

Strand 10: Water & Solid Waste
Unit 10: Water Conservation
Topic 2: CWSA: Case Study

Activity 29: Water Facility Field Visit

Purpose: Deepening student understanding of the Central Water and Sewerage Authority (CWSA)'s work in water management and distribution; allowing students to observe one of the CWSA water facility sites.

Time needed: A half-day field experience

Resources needed

- For each student on the field visit: writing pad and paper, pens and pencils, sketch pad
- The list of questions developed out of *Activity 28*

Procedure

Step 1: Arriving at the location, begin with a pre-arranged introduction for the students given by a CWSA officer.

Step 2: Have a pre-arranged guided tour of the CWSA water facility site with the CWSA officer. (Varying amount of tour time)

Step 3: End the visit with a pre-arranged session with CWSA personnel, at which students can pose the questions prompted by the tour and questions prepared beforehand in class, follow up on things they have not understood and share their thoughts and feelings.

Potential/Facilitation Tips

The classroom teacher needs to arrange a CWSA site visit well in advance through the CWSA Headquarters in Kingstown (phone: 784-456-2946). CWSA is keen to support and work with schools. Discuss the options available (e.g. locations, time and duration of the visit). Ask the CWSA personnel to highlight the details of water treatment and distribution procedures and impacts of climate change and disaster on water management and distribution systems in SVG. Also, ask her/him to discuss various ways students and schools can contribute to better water management and conservation.

It is also important to ensure permission from the principal and school authorities ahead of time, consent for student attendance on the visit from parents/guardians, and agreement from some parents to accompany and help with the visit.

In preparation for facilitating this activity, read *Case Study 23: Central Water and Sewerage Authority (CWSA)* in the *Resource Manual*.

Curriculum Links

This activity can connect to the Earth Science theme of the Form 3 Integrated Science and Technology curriculum, where students are asked to describe the effects of climate change on the human and natural environment. It can also be aligned with the 'Natural Systems (Physical)' part of the Form 3 Geography curriculum, which includes a sub-section on rainfall and Caribbean weather systems exploring the impacts of different weather phenomena.

Strand 10: Water & Solid Waste

Unit 10: Water Conservation

Topic 3: Water Conservation School Action Plan

Activity 30: Water Conservation Actions at School

Purpose: Developing and implementing student-led water conservation actions for the dry season at school

Time needed: 105 minutes plus a various amount of time to implement proposed actions

Resources needed

- Access to online audio clip, *CWSA Urges Water Conservation*
<https://www.nbcsvg.com/2014/04/16/cwsa-urges-water-conservation/>
(3:28 minutes)
- A chart paper and markers per group

Procedure

Stage 1

Step 1: Play the online radio clip, *CWSA Urges Water Conservation* and invite students to share their reactions to what they have heard. At an appropriate point, highlight that water shortages during the dry season is a recurrent issue on SVG and that climate models suggest that SVG will experience more dry periods and further reductions in rainfall in the future. Invite further reactions from students. (15 minutes)

Step 2: Explain to the class that their task is to develop a school water conservation action plan, especially for the dry season. Drawing upon the information in *Box 20*, explain the types of water conservation actions students might take at school. Invite students to share other water conservation action ideas for implementation at school. (10 minutes)

Box 20

- Monitor and record water usage at school
- Conduct surveys regarding water conservation practice
- Check water leaks at school
- Check the level of water efficiency in school facilities (e.g., toilets, taps)
- Limit water use in the school garden (e.g., planting drought-resistant plants, mulching the garden beds)
- Develop awareness-raising materials (e.g., signs, posters, stickers)
- Organize awareness-raising performances using jingles, street theatre, song, displays and events

Step 3: Form groups of five and assign one of the water conservation action areas arrived at in *Step 2* and have them come up with a concrete action plan by clarifying

(1) specific steps to be taken; (2) who does what; (3) timeline and schedule; (4) resource/support needed. Have each group write down key points agreed. (20 minutes)

Step 4: Ask each group to present what they have discussed. Invite others to offer constructive comments on what has been presented. Then have each group update their plan by incorporating ideas and comments received. (30 minutes)

Stage 2

Have each group implement its action plan. (Various amount of time)

Stage 3

Ask each group to reflect on: (1) if and how their work has contributed to water conservation at school and (2) how would they conduct the activity differently next time? Hold a whole-class discussion to consider lessons learned. (30 minutes)

Extension

Have students take practical water conservation actions at home during the dry season and share what they have done.

Potential/Facilitation Tips

While the radio clip used in *Step 1* is quite old (April 2014), it is a stark reminder to students that similar situations tend to occur more frequently and over a longer time in SVG.

Before or during *Stage 1*, make sure to run the student action ideas by the headteacher and obtain 'in principle' support as some of the actions (e.g., awareness-raising materials and events) will affect the whole school community. Also, inform and seek help from those who have water-related data and look after water facilities at school (i.e., school administrators and school caretakers).

In terms of specific materials and support requested (*Step 3*), have each group creatively consider how they might obtain them. For instance, they might obtain drought-resistant plants and mulch materials from parents or neighbors for the school garden. Other than that, provide necessary resources and support as appropriate.

This activity should be implemented during Term 2 or at the beginning of Term 3 so that student actions are implemented and make a real difference in water conservation at school during the dry season.

Curriculum Links

This activity aligns with the 'Disaster Preparedness' learning outcome in the Form 3 Health and Family Life Education curriculum, which includes an indicator that students 'examine disaster preparation strategies for SVG'. It can also be aligned

with the Earth Science theme of the Form 3 Integrated Science and Technology curriculum, where students are asked to describe the effects of climate change on the human and natural environment. In addition, if music is used as one of the awareness-raising modalities, this activity can complement the 'Expressing and Communicating' indicator of the Form 3 Creative Arts Music curriculum.