ALONG THE CAYS AND BAYS: CLIMATE CHANGE LEARNING IN A SMALL ISLAND DEVELOPING STATE

DAVID SELBY, FUMIYO KAGAWA AND ROWAN OBERMAN

Abstract: This article argues that small island developing states (SIDS), while often particularly vulnerable and susceptible to natural disaster and climate change, have, in their smallness, remoteness and localised understandings of sustainability, latitude for innovation that larger, more globally embedded jurisdictions do not enjoy. On that account some of the most path-finding initiatives in climate change learning are happening in SIDS environments. The article focuses on the archipelagic Caribbean nation state of St. Vincent and the Grenadines (SVG), describing and critically reviewing leading-edge initiatives in climate change learning. Those initiatives include the non-governmental organisation Sustainable Grenadines (SusGren); the activist movement, the Union Island Environmental Attackers (UIEA), the students on the Grenadine island of Bequia fulfilling a leadership role in community coastal monitoring and conservation under the Sandwatch initiative; and the SVG government-inspired Climate Change Mitigation and Adaptation/Disaster Risk Reduction (CCMA/DRR) school curriculum initiative. Taken separately and together, these case studies raise important considerations of wider significance for re-conceptualising 'good practice' in climate change education. First, we note that each initiative is characterised by a melding of formal and non-formal learning, school and community learning, and child/youth and adult learning. Second, we discern a deep-rooted activist and extra-institutional dimension woven throughout both formal and non-formal learning. Third, we observe that the learning moves beyond the interdisciplinary and is marked by a strong trans-disciplinary dimension. All of these traits, it is argued, carry important lessons for climate change learning that is visionary, practical, contextualised and responsive to the dire global condition.

Key words: Climate Change Learning; Formal and Non-Formal Learning; Youth and Community Participation; Interdisciplinary and Trans-Disciplinary.

Islands as spaces of fragility and innovation

Small-island states and dependencies, including those islands describing themselves as 'small island developing states' (SIDS), commonly face challenges of 'fragility, remoteness, natural resources limitations, vulnerability to external shock, susceptibility to natural disaster and dependence on international trade' (Sprague, 2016: 52). Exacerbating and multiplying the challenges they face are climate change and associated impacts such as sea-level rise, increasing extremes and volatility in weather patterns, the degradation of coastal environments, the destruction of coral reefs, diminishing availability of freshwater, and an ever present threat to biodiversity as coastal and inland natural habitats are diminished (Ghina, 2003).

These vulnerabilities notwithstanding, small and remote islands are suggestive of latitude for innovation, of 'being on the edge, being out of sight and so out of mind; situations which both expose and foment the weakness of mainstream ideas, orthodoxies and paradigms' (Baldacchino, 2006: 6). The insular 'beckons specificity, greater malleability, less inhibition', a 'proneness to novelty'; traits that are compounded by smallness of territory and population (Ibid). They share characteristics in common with remote, landlocked peripheries where, often contrary to expectations, surprising achievements can follow from giving frontline attention to culturally appropriate and place-harmonised processes and outcomes in a context of relatively unhindered pursuance of the innovative (Hall and Donald, 2009; Eder and Trippl, 2019).

As with other small island states in the Caribbean, the archipelagic cays and bays of St. Vincent and the Grenadines (population: 111,000) are at risk from multiple hazards carrying the potential to set back development, aggravate environmental breakdown and jeopardise lives, livelihoods and communities. The country faces both climatological and geo-seismic threats. Climatological hazards, increasing in frequency and intensity as climate

change accelerates, include hurricanes and tropical storms causing serious infrastructural and economic damage; storm surges stirred up by deep weather depressions that, in conjunction with rising sea levels, bring coastal erosion and damage to coastal communities. SVG also faces elongating periods of drought allied with increasing intensity of rainfall in the fewer rain days, the torrential downpours leading to landslides, flooding and contamination of water supplies. Geo-seismic hazards that threaten SVG include: the ever-present prospect of earthquakes; a repeat of the 1979 eruption of La Soufrière, the active volcano dominating the north of the mainland; and an active submarine volcano lying off the Grenadines, known as Kick 'em Jenny, threatening coastal communities through the entire archipelago with a potentially deadly tsunami event (Caribsave, 2012; Murray, 2014; World Bank Group, 2020).

Against this tapestry of multiple risk, formal and non-formal learning in disaster risk reduction, climate change adaptation and mitigation and environmental conservation take some interesting turns, marked by an innovative intermingling of formal and student and community learning within what are predominantly trans-disciplinary learning frameworks. Four such initiatives are featured here, namely the work of the non-governmental organisation Sustainable Grenadines (SusGren); the activist movement, the Union Island Environmental Attackers (UIEA); the Sandwatch beach and coastal monitoring and conservation initiative on the Grenadine island of Bequia; and the SVG Climate Change Adaptation and Mitigation/Disaster Risk Reduction national school curriculum. Data presented is drawn from documentary sources and from a face-to-face interview with Kristy Shortte, Program Officer, Sustainable Grenadines on 9 November 2019, followed by an exchange of correspondence on 12-13 February 2020, and an interview with Katrina Collins, President, Union Island Environmental Attackers, on 10 November 2019.

Sustainable Grenadines

Union Island is the most southerly island in the St. Vincent and the Grenadines archipelago. It has diverse terrestrial vegetation ranging from savannah,

thickets, mangroves, complex forest systems, to secluded palm and coconut-fringed white sand beaches. Due to its mountainous topography, 85 per cent of the population of 3,500 lives on a narrow coastal strip and nearly 80 per cent of the island population is heavily dependent on the marine and coastal environment, making them vulnerable to the effects of climate change (SusGren, 2018).

Starting life in 2002 as an eight-year funded biodiversity conservation project in the Grenadine islands, Sustainable Grenadines (SusGren) became, in 2010, a trans-boundary NGO (i.e. also covering Grenada and its islands) based on Union Island. As the hub of a network of civil society organisations in the Grenadines, its mission is to 'empower the people of the Grenadines to make wise use of their natural resources through environmental education and stewardship-building, sustainable livelihoods, biodiversity conservation, climate change adaptation and strengthening of civil society organizations' (SusGren, 2018).

Its work has focused on six main programme areas: stewardship building (i.e. empowering and mobilising stakeholders to take action to protect the environment); civil society strengthening (i.e. building the capacity of community-based organisations in the Grenadines sharing the SusGren vision through training programmes and networking); biodiversity conservation and Marine-Managed Areas or MMAs (i.e. safeguarding marine ecosystems and the fisheries); sustainable livelihoods (i.e. promoting and supporting a diversity of livelihood opportunities so as to protect bio-diverse natural resources for future generations); climate change adaptation (i.e. educating about and investing in climate-resilient infrastructure and nature-based adaptation measures); capacity building for a strong and effective SusGren (i.e. improving SusGren's governance, human resources, external communication and partnership building, monitoring and evaluation, and gender integration) (SusGren, undated a).

SusGren's various initiatives have interwoven formal education and non-formal/community education opportunities. One of the noteworthy

examples is the Junior Ranger Program that started as a one-year pilot project in 2014. This Saturday programme was aimed at preparing the younger generation to contribute to long-term improvement in MMAs by providing environmental education and awareness raising training for a small group of students on Union Island aged between 10 and 13. Working closely with schools and parents, SusGren selected 14 enthusiastic students who wished to learn about the environment. The yearlong programme offered interactive and experiential learning opportunities focusing on various environmental topics ranging from turtle preservation, bird conservation and pollution through to climate change impacts and solutions in the community. Student participants learned by being out in nature, sharing perceptions and working together cooperatively on projects. The student participants periodically shared their learning and experiences with their peers and teachers back at school and with adults in the community.

At the time of writing, five years after the end of the funded project, former programme participants who are now at the higher level of secondary school are still engaged in various initiatives organised by SusGren and Environmental Attackers (see next section). For instance, they have enthusiastically participated in SusGren's annual international coastal cleanups, initiated beach cleanups throughout the year with their schools and been involved in bird monitoring. Kristy Shortte, SusGren Program Officer, explains that after participating in activities such as environmental monitoring and beach cleaning, students encouraged adults to become part of those initiatives and take up advocacy for positive change. This one-year programme has helped create a group of young environmental ambassadors or champions who influence others, including their elders, to take up pro-environmental attitudes and actions. SusGren, Kristy explains, hopes that these young people will continue with their environmental activities, perhaps take a career path relating to the environment and become Union Island community environmental leaders in future. The organisation is seeking funding for a further cycle of the Junior Ranger Program.

SusGren's Connecting Kids with Nature Project in 2016 which involved 31 students aged between 11 and 13 years from Union Island and the neighbouring Grenadine island of Mayreau, is another environmental education initiative which aimed at helping school-age children become stewards and advocates for the marine environment. Combining indoor education sessions (covering diverse environmental topics including mangrove restoration, coral reef protection, fish, pollutants and climate change) with outdoor practical sessions on swimming, snorkeling and identification of animals and ecosystem exploration, this three-week project provided participating students with opportunities to develop their emotional connection with nature, which SusGren regards as crucial for nurturing committed environmental stewardship. SusGren's intention is to follow up this project in the form of monthly coastal cleanups, community film screenings, a Junior Ranger Program and/or a Community Researcher Program (i.e. developing capacities of selected community members to monitor MMAs) and actions to raise the standard and quality of environmental education within schools (SusGren, undated b).

Another notable initiative has been the restoration of the Ashton Lagoon mangrove swamps, SusGren working with local communities, other local NGOs, government ministries and international partners. A failed marina development in the 1990s on the lagoon, located on the south coast of Union Island and comprising the largest natural bay and mangrove systems in the whole of SVG, caused catastrophic ecological damage. The causeway built across the lagoon by the failed marina project had reduced water flow to destructive effect smothering the seaward coral reefs in mud. The mangrove was in seriously unhealthy condition. Water stagnated and became polluted and habitats were destroyed, severely affecting the lives and livelihoods of the Ashton community. By mobilising stakeholders including, importantly, the local community over a 13-year period by means of an initial participatory community-planning workshop, taking part in the ongoing surveys and monitoring of the reviving ecosystem, and by helping with the planting of 3,000 red mangroves, Ashton Lagoon has again become a thriving marine and coastal environment. Junior Rangers were actively involved in the mangrove

propagation and planting processes. Members of the public, school children and teachers now regularly visit the newly created Lagoon Eco Trail and Climate Change Interpretive Centre, both achievements of the restoration project, to learn about birdlife, the lagoon and climate change adaptation and mitigation.

SusGren's Ashton Lagoon tours arranged for schools are closely linked to specific curriculum topics taught in the local schools (e.g. ecosystems) so that students can deepen and widen their learning. The facilities are also used to raise awareness among visitors of the part mangrove can play in mitigating and adapting to climate change. Mangrove restoration is a prime example of a natural solution to climate change where nature conservation, restoration and reforestation, allied with good land management, can increase carbon storage. It also contributes to climate change adaptation by offering protection against storm surges, coastal flooding from high seas and by ensuring livelihoods for local people through sustainable tourism and the provision of new forms of environmentally harmonious employment such as highly nutritious sea moss cultivation, as developed by SusGren in conjunction with the Ashton Multi-Purpose Cooperative. SusGren's bee keeping training, given to 15 local adults who went on to train other community, members has resulted in the launch of a sustainable local industry producing delicious mangrove honey and offering livelihoods to locals (Lewis, 2019; Sorenson, 2008; SusGren, undated c).

Union Island Environmental Attackers

Established in 1999, the community activist group, Union Island Environmental Attackers (UIEA) was the brainchild of a then teenage girl, Katrina Collins, who now serves as the organisation's president. Her idea was to 'talk to the schools, talk to the homes and talk to the businesses' to gather community momentum behind environmental protection and community improvement. 'For me', she says, 'human, nature and the environment (are) connected. We work hand in hand with the environment so we can protect it more and encourage people more to do what's right. Being an environmentalist means to me being a true advocate for your society' (Ensia,

2014). From the outset the idea was to 'work with the children, to start with the young' as a means of catalysing parental and community involvement. In those early days, the attention-grabbing name of the nascent organisation led to lively debate, some dubious as to how it would be perceived by potential funders, but it came to receive general acceptance. Katrina recalls those debates. 'Someone said, "Why Attackers?"' The answer we gave was: 'because people attack the environment in a negative way, but we can show people that we can create positive change out of the negative. We can attack the problem'.

A series of initiatives followed from the all-volunteer organisation. These began with garbage cleanups of beaches and illegal disposal sites led by young people concerned to maintain the beauty of the natural habitat and to ensure future tourist-based livelihoods. As part of the effort the SVG Central Water and Sewerage and VINLEC, the St. Vincent Electricity Services, were enjoined to provide 140 garbage bins for the island. Over the years such one-off cleanups have been systematised into quarterly events with a major annual cleanup campaign involving all the island schools, members of the community, and local businesses beginning on World Wetlands Day (2 February) and continuing through to Earth Day (22 April). This sometimes takes place through planned 'Green Walks' in which the schools are significantly involved. Other initiatives include: regular 'Adopt a Tree' planting and monitoring programmes as a contribution to climate change adaptation and mitigation; school and community-led seawater tests to ensure bathing safety and a healthy environment for coastal fauna and flora; periodic campaigns to persuade shops to dispense with plastic bags accompanied by the distribution of canvas shopping bags to each home on the island (slogan: There is a Price. Let's Do It Right to Save Paradise); bird watching events; Leatherback Sea Turtle conservation monitoring during the April to July close season each year when the turtles visit the beaches to lay their eggs (a form of citizen science for young people in which arrivals are recorded, untagged turtles tagged and the number of eggs recorded, with beaches patrolled throughout the close season to guard the turtles) (Off the Grid Caribbean, 2011; OPOE, 2016).

Perhaps most remarkable for a volunteer organisation of 28 regular members has been the response to the challenge of increasingly dry weather occasioned by climate change. Longer and more frequent spells of dry weather had exposed the lack of surface water sources on Union Island as well as the lack of effective and sufficient water storage facilities on homes and public buildings. 'We realized', says Katrina, 'that climate change is real, and we recognized it in our own community because with the longer dry spells we no longer had the amount of rain'. In response Environmental Attackers embarked upon a water tank project in conjunction with SusGren to increase water storage harvesting capacity (OPOE, 2016; UIEA, 2019). This significant climate change adaptation initiative has advanced over a number of stages. In the first stage 55 low-income homes received 1000-gallon water tanks purchased with a grant from the Canadian International Development Agency and installed by the community. In a second round a grant from the Global Environmental Facility enabled a further 55 homes to receive a water tank. Having doubled the water holding capacity of Union Island (Lighthouse Foundation, undated), Environmental Attackers went on to install water tanks on the sister islands of Mayreau and Canouan, including larger tanks for primary schools. Allied to the provision of water tanks has been the holding of community workshops for adults and youth on wise use of water.

A further significant success of Environmental Attackers has been its partnership with Fauna and Flora International and the SVG Forestry Department to campaign to protect the endangered Union Island Gecko. A desired object in the international reptile trade, this beautiful, multi-coloured lizard, endemic to 50 hectares of forest habitat on Union Island, was under threat from reptile collectors, and so much so that its numbers had plummeted. Protected under SVG law but not under the Convention of International Trade in Endangered Species (CITES), the Gecko was under constant threat. Here Environmental Attackers played a crucial role in patrolling and safeguarding the Gecko in its habitat while also undertaking a community awareness campaign and campaigning for CITES listing. That listing came in 2019. For UIEA campaigner, Roseman Adams, this decision not only protects the iconic

Gecko but 'will spill over into a stronger community bond. Such bonds help communities to grow and become more developed as people' (Drury, 2019).

Woven through the multi-stranded work of UIEA is an approach to climate change, sustainable and environmental learning that breaks out of the commonly understood mould. Where, we may ask, does the learning begin and where and how does it reverberate? In some cases, such as the Gecko protection initiative, UIEA volunteers periodically visit all schools on Union Island to update students and teachers on what is happening. The visits aim to dovetail with an appropriate moment in the school curriculum so that students can engage post-visit with the new learning stimulus. Sometimes the UIEA volunteers present to a school assembly; sometimes they make a beeline for a particular class that has expressed interest in activist participation in a SusGren project. Says Katrina: 'We can choose a class which is interested in working in the field or we can speak to everybody so that they can have some knowledge about it. So, everybody has the information'. Particularly through the former approach, a small group of students who are interested in active engagement with a project are identified and subsequently go through a field training process. It is these students in particular who, rather like SusGren's Junior Rangers, keep their school and class informed about what they have been experiencing out in the field, who attend and speak at stakeholder meetings, who participate in non-formal and informal learning events at the UIEA Learning Resource Centre and who fulfil a broad community role as environmental advocates. Schools also engage their teachers and student community in the UIEA environmental cleanups as a regular part of the school year. They have played a role, too, in bringing the key messages of successive rainwater harvesting initiatives to the student community, messages key to climate change adaptation. Slowly but steadily, an impactful activist community is emerging, finding succour and support from within formal and non-formal island learning contexts. Formal and non-formal learning are, indeed, becoming blurred entities. Appositely, the catchy UIEA theme song carries the refrain 'Motivation, Communication, Liberation, Education, Transformation'.

Sandwatch

Seven miles long, Bequia is both the closest to the St Vincent mainland and the largest of the Grenadine islands. It is home to a population of about 5,000 people. The island holds a green mountainous interior with largely calciferous soil and no freshwater resources. People's livelihoods are therefore predominantly tied to the coast. Most depend on fishing. Like elsewhere in SVG and the wider Caribbean, climate change generates additional pressures and vulnerabilities for Bequia. Coral bleaching, increased droughts and hurricanes and sea-level rise are some of the consequences to which Bequia is having to adapt. Paget Farm is one of the larger settlements on the island. It is positioned on the south side, where there are fewer tourist facilities. In 1990, Paget Farm saw the construction of Bequia airport on reclaimed land. While increasing the island's accessibility, this construction has impacted greatly on local coastal life. The airport development disrupted the marine currents flowing past the island. It also created an inlet between the reclaimed land and the existing coastline. This channel acts like a funnel, making Paget Farm a collection point for marine debris and pollution from surrounding islands. Beach erosion and water shortage are further concerns with which the area contends (ESPG, undated; Bequia Community High School, 2005).

Initiated in the Caribbean, the Sandwatch project brings together students and wider communities to monitor their local coastal environments, 'critically evaluate' the problems and conflicts they face (UNESCO, 2010: 9) and take action for their improvement. Supported since its inception by UNESCO, the programme grew out of a workshop held in Tobago in 1998 and is now active in over 50 island and coastal areas worldwide. Coordinated by the Sandwatch Foundation, the project has provided workshops, competitions, online support, magazines as well as an open-access manual documenting the Sandwatch methodology of 'monitoring, analysing, sharing and taking action', (UNESCO, 2010: 8). Recognising beaches as an ecosystem particularly vulnerable to the impact of climate change, Sandwatch promotes climate change learning through local observation and engagement.

The activities of the Sandwatch programme in Bequia exemplify the project's objectives and its potential to merge curriculum learning with community action and development to the enhancement of both. In 2005, for example, Bequia Community High School, participating in the Sandwatch project, led a clean-up and rehabilitation of the drain in Paget Farm. The actions involved: water sampling, analysis and recording; direct community action (debris clearance; mud excavation, the installation of debris traps and landscaping); and public awareness raising, in particular using local media sources to encourage local fishermen to stop polluting, engaging community youth in the maintenance of the area and sharing experiences worldwide through the Small Island Voice of Youth Internet-based Forum (Cambers, 2004). Involving and impacting on the local community, the project activities profited from and contributed to wider local knowledge. The project supported students' curriculum learning back at school, requiring them not only to rehearse but also apply scientific method and understanding in their local community contexts. It engaged students in meaningful, authentic and methodologically rigorous local scientific inquiry. Integrated across the curriculum (UNESCO, 2005) and into after-school activities it transgressed traditional disciplinary, school/community and formal/non-formal learning boundaries. In these ways, the project modelled the approaches being found to characterise effective climate change education, i.e. trans-disciplinary, participatory and including aspects that are local and relevant to learners (Anderson, 2012; Monroe et.al., 2019).

The programme also challenges traditional learning hierarchies, with students acting not only as knowledge consumers, but also participants in knowledge creation and sharing. An example of this, again in Bequia, is the involvement in 2009 of the Sandwatch group in the SVG Bureau of Standards water quality analysis project at the Bequia Fisheries Complex in Paget Farm. Here, data on water quality, collected by the group, was used to inform the planning and development of a water filtration and desalination project. In this way, students engaging in the programme contributed necessary data for the development of a whole community initiative.

These learning activities, while rooted in the local and lived experiences of the community, bring to the fore the impact of climate change as well as adaptation and mitigation measures. Rising sea levels, ocean acidification, increased drought and floods and influxes of Sargassum seaweed are amongst the climate change related issues which can be analysed and explored, while initiatives like the installation of a solar-powered desalination project, supplying water to drought-prone homes, provide examples of how Bequia is adapting to and mitigating against a changing climate.

The implementation of the Sandwatch project in Bequia as elsewhere depends on local leadership and, consequently, has waxed and waned. However, the legacy of the achievements of the project are evidenced in the testimonies of those involved. Michelle Williams-Stowe (2017), a Sandwatch coordinator in Bequia, notes how 'students were more knowledgeable in how to go about keeping not only beaches clean but also their community as a whole. What was more impressive was the fact that this newfound information did not stay with those directly involved in the programme, but was spilled over to family members, friends and community personnel'.

The SVG Climate Change Mitigation and Adaptation/Disaster Risk Reduction curriculum

A Climate Change Mitigation and Adaptation/Disaster Risk Reduction (CCMA/DRR) curriculum is in process of being implemented by the SVG government. It offers a modular curriculum for each of secondary grades 1, 2 and 3, the same ten strands framing each module. Those strands are: hazards and disasters, climate change, climatological hazards, geological hazards, human-made hazards and epidemics, planning for disasters, the marine environment, the land environment, ecosystem and biodiversity threats, and water and solid waste. The curriculum thus recognises the tangled interface between climate change and disaster risk while also underlining the deep interconnectivities with other environmental issues. As such, it aligns with latest thinking on what is being called the Eco-system-based Disaster Risk Reduction approach. Eco-DRR recognises that healthy ecosystems provide livelihood benefits and build resilience against hazard while also maintaining

biodiversity and containing carbon release (IUCN a, undated). The curriculum also anticipates the upcoming UN Decade on Ecosystem Restoration (2021-2030) aimed at 'reversing the degradation of ecosystems such as landscapes, lakes and oceans to regain their ecological functionality' (IUCN b, undated). The CCMA/DRR curriculum is cross-curricular, identifying subject and syllabus content with which particular units can be dovetailed and highlighting potential interdisciplinary delivery strategies for teaching teams. Very importantly, too, the curriculum is built around activities that employ a wide and varied range of interactive, participatory and experiential learning modalities. There are 91 activity units in all. In place of a textbook SVG-based case study material is laid out in a teachers' *Resource Manual* (Government of SVG, in press a).

Of particular note for the purposes of this article is the emphasis laid throughout the curriculum on student learning bridging different learning zones (see Fig.1). Climate change and disaster risk learning happens in – and moves between – classrooms, school and local community with insistent regularity. Let us take, for example, the grade 3 curriculum. Early in the school year, students quietly draw their own images of a climate-changed future before sharing these with each other in a class milling exercise. As a next step, and out of school, they ask community members to draw their own images, going on to interview them on the thinking behind what they have drawn. Adult images and interviews are shared and analysed back in class. In a succession of activities on the increasing incidence of drought on SVG, students go out of school to interview adult community members on their drought experiences and reflections, analyse the data gathered, examine the differentiated impact of drought on different social groups, and explore noteworthy local examples of drought preparedness action. In a further sequence of activities, groups of students use class time to prepare for a community disaster risk mapping exercise before spending time out in the community undertaking a disaster vulnerability and capacity transect survey that also involves interviews with local people on their risk perceptions. The activity builds upon activity sequences in grades 1 and 2 where students

develop and advocate for, respectively, their family disaster preparedness plans and school disaster management plans.

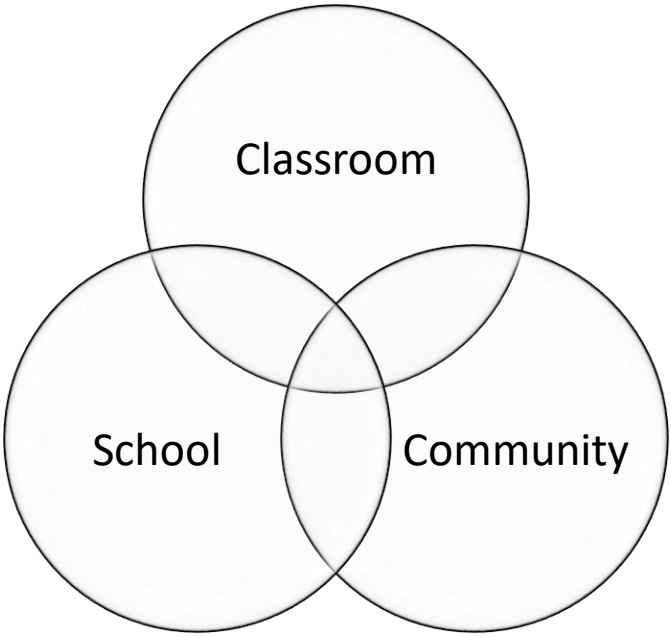

Figure 1 CCMA/DRR Learning Zones.

Back in class they present the transect maps and data they have collected. In a second activity, the class put questions arising from the survey and about community risk in general to a visiting member of the Community Disaster Management Committee (CDMC), having also scrutinised the local Community Disaster Management Plan. Working through the data collected from the transect survey and from the CDMC visitor, the class develops disaster awareness messages they wish to flag to the school and local community. Presentations, involving posters, photo displays, song, dance, dramatic sketches and/or a puppet show follow for the school, local primary schools and the wider community. The sequence ends with class reflection on

community responses. Later in the school year, students engage in designing and implementing a school biodiversity action plan, bringing in local naturalists and re-wilding and biodiversity experts at the planning stage, negotiating permissions with the principal and school staff, and bringing in community members to help with the implementation process. A closing activity for the school year involves a similar process of planning and negotiating, and then implementing a school water conservation plan for the dry season. A further step asks students to advocate with their families for the home implementation of the water conversation measures they have learnt about (Government of SVG, in press b, c).

Another feature of the curriculum is the building in of partnership engagement between schools and governmental and non-governmental climate change, disaster risk and environmental organisations. In grade 3, officers of the SVG National Emergency Management Organisation visit class to engage with students' questions as part of a case study research activity (students subsequently hosting poster exhibits of their work to raise awareness across the school community). Later in the year, they consider epidemic threats facing SVG before drawing up epidemic prevention plans. School and community stakeholders, including the SVG Red Cross Society, are invited into class to give feedback and work on improving the plans. There follows a lesson involving interview research into SusGren and the Union Island Environmental Attackers to find out about their goals, philosophy, projects and their different approaches to effecting change, and then, a session using video material to understand how the SVG Central Water and Sewerage Authority (CWSA) is dealing with the challenges posed by changing climatic conditions (Government of SVG, in press b).

Field trips also figure significantly in the curriculum. At the close of the grade 1 school year, the field trip focus is on examining the biodiversity of the highland tropical rainforests of the SVG mainland. A pre-trip class session is given over to video familiarisation with the forest and explanation of the activities groups and individuals will conduct in the field (such as square metre searches and assembling photographic and sound collages). Back at school the

class prepares a biodiversity exhibition to coincide with the 22 May International Day for Biological Diversity. In grade 2, classes visit an organic farm, typically the Richmond Vale Academy activist training centre (RVA, undated), to learn about sustainable agricultural practices. Returning to school, students prepare and host a sustainable farming display for the school community. In grade 3, students visit the CWSA water facility for an explanation and guided tour of how water is managed and distributed on the SVG mainland and how climate change and increasing weather-related hazard is affecting operations and what adjustments are being made by way of adaptation (Government of SVG in press, b; c; d).

The SVG CCMA/DRR curriculum is thus characterised by learning that spills beyond the classroom and that regularly features enquiry-based and activist elements. Existing borders between classroom, school and community are frequently crossed as, after some learning initiation in class, learners engage with community perspectives and practice before going on to reflect upon and organise their new ideas and insights. That new learning is then presented and advocated for in wider school and/community arenas, responses received perhaps necessitating a further review and reassessment of their conclusions and advocacy agenda. Within such a dynamic, processes of formal and non-formal (and, indeed, informal) learning begin to fuse, with the number of incidental 'teachers' with whom the students engage proliferating prodigiously. Such a dynamic integrates schools, local community groups and governmental and non-governmental organisations as partner-animators of the learning process in exciting new ways.

The edginess of the periphery: climate change, disaster risk and environmental education along the cays and bays

Patrick Barkham (2017: 309) writes that:

> "The centre needs the periphery as a source of inspiration and renewal, just as the periphery relies on the centre. The centrifugal forces that continue to deposit money and power in global

corporations or global cities such as London seem stronger than ever. We must maintain the edginess of the periphery".

In its edgy way the periphery is saying that the climate breakdown we imminently face with its insistent procession of disasters and environmental catastrophes cannot be seriously addressed unless we break free of the silos in which we habitually live and learn. In her recent book, *On Fire: The Burning Case for a Green Deal* (2019: 289), Naomi Klein argues that those wanting to confront climate change must tear down the scaffolding that separates egalitarian, justice and environmental movements and form a 'truly intersectional mass movement'. The case for the tearing down of boundaries applies to our established learning spaces, too. The preponderance of formal learning for children and young people remains abstract, compartmentalised and divorced from the fears of millions (Rousell and Cutter-Mackenzie-Knowles, 2019). It is the yawning gap between climate change realities and the diet of blinkered, fenced-in learning offered in most schools that triggered the school strike movement in 2019 when, on successive Fridays, students across the globe left their schools to demand climate change emergency action (Laville, 2020). What these small island case studies convincingly illustrate, in our view, is the importance to transformative climate change, disaster risk and environmental education of boundary crossing where the acquisition and application of knowledge, skills, perspectives and insights flows and reverberates between classroom and school, school and home and school and community (Grossen, Zittoun and Ros, 2012; Heddy and Sinatra, 2013; Pugh and Girod, 2007). The trans-disciplinary nature of the learning, happening anywhere but in no subject in particular, the formal, non-formal and informal dimensions to the learning, the liquid movement between zones of learning all underline a deft transgression of established learning borders. It is lightness in boundary crossing that has to be achieved if climate learning that is fit for transformative purpose is to happen.

The path-finding learning described here places young people (and adults) in empowering and responsible positions as teachers, researchers, experts and leaders as well as learners. It emerges out of pedagogical practice

that is critical, dialogic, communitarian and of serious transformational endeavour (Freire, 1996). The learning is of self-professedly activist intent. The activist learning we describe is also happening in communities where it is reported by an SVG-based educator/artist that youth are being progressively disoriented and uprooted by globalisation and its attendant consumerism (Roudette, 2011). Handing the activist torch to the youth of the islands thus has an emancipatory and resilience value that works through social pathologies while addressing climate change, disaster risk and environmental degradation. Learning imbued with a decidedly activist ethos is where institutions, organisations and movements need to go if climate change is to be addressed in ways that drill into the roots of the matter.

We have been writing about small islands, edgy places, small in size, and small in population. To conclude we would also underline that the people living along the cays and bays are close to place. For increasing numbers of people today this is not the case; for most of us 'daily existence is increasingly disconnected from the physical places where we reside' (Klein, 2019: 124). This presents a huge problem for those pursuing effective climate change, disaster risk and environmental education in that the 'terrain on which climate changes are taking place is intensely local' requiring 'intimate connection to a specific ecosystem' (Ibid). Inhabitants of the cays and bays note the increasing dry seasons, the changes to beaches, the loss of habitat, and, as we have noted, are rising to the challenges of climate change and eco-destruction. How do those in far-from-periphery places, where place rarely intrudes on daily consciousness, promote the place-based 'immersive and experiential learning experiences' and the 'deeper links with local community initiatives and innovations' which some development educators (Walsh, 2015) see as the best means of galvanising commitment to transformative change in the context of climate breakdown? We need the periphery to speak to us on this worryingly thorny question.

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David Selby is Founding Director of Sustainability Frontiers, an academic non-governmental organisation primarily concerned with climate change and disaster risk and their implications for understandings and directions in sustainability education. He also focuses on multiple dimensions of transformative environmental education, including place-related, re-wilding and biodiversity learning. His recent major co-publications with Sustainability Frontiers' colleague Fumiyo Kagawa include; Working Together for Resilience (HOPE'87/Sustainability Frontiers, 2019), Sustainability Frontiers: Critical and

Transformative Voices from the Borderlands of Sustainability Education (Budrich, 2015), Climate Change in the Classroom (UNESCO, 2013), Disaster Risk Reduction in School Curricula (UNESCO/UNICEF, 2012) and Education and Climate Change: Living and Learning in Interesting Times (Routledge, 2010). He is an Associate of the Centre for Human Rights and Citizenship Education, Dublin City University, Ireland and was earlier Professor of Education and Director of the International Institute for Global Education, Ontario Institute for Studies in Education, University of Toronto, Canada. For further details of his work and publications, visit: http://www.sustainabilityfrontiers.org

Fumiyo Kagawa is Research Director of Sustainability Frontiers. Fumiyo has coordinated, engaged in and led a wide range of international research and development initiatives focusing on diverse issues linked to the rights of the child primarily in the field of education. A few of these were commissioned by United Nations' organisations, international non-governmental organisations (INGOs) and governments and involved exploring issues connected to curriculum, pedagogy, climate change mitigation and adaptation, disaster risk reduction, resilience building, life skills, peace building, child/youth participation and democratic governance. Fumiyo has extensive experience in conducting participatory research focusing on quality of learning and pedagogies and has developed teaching and learning materials at primary and secondary levels as well as teacher capacity building programs and materials. Her key co-publications with David Selby are listed above. She is an

Associate of the Centre for Human Rights and Citizenship Education, Dublin City University.

Rowan Oberman is Assistant Professor in Global Citizenship Education (GCE) and Co-Director of the Centre for Human Rights and Citizenship Education at the Dublin City University Institute of Education. She has considerable experience in GCE in both formal and informal education contexts. She lectures on BECE, BEd, PME and MEd programmes in global citizenship education. She has written a wide range of educational resources including Creating Futures, an online resource providing innovative climate change lessons for senior primary classrooms. Partnership has always been a strong dimension of Rowan's work. She is an Associate Member of Sustainability Frontiers. She coordinated Just Children, a partnership with the Irish NGO, Trócaire and she was chair of the advisory committee for the European Union (EU)-funded Irish Global Schools Project. Her areas of research interest include children's rights, climate change education, global citizenship education and critical literacy. She is also a qualified barrister and specialised in human rights and family law.