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Archipelagos of learning: environmental education on islands

THEMATIC SECTION
Humans and Island Environments

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SUMMARY

This article appreciatively reviews environmental education practice on islands through the lens of four key strands of environmental education discourse: biodiversity, conservation and science-framed education; place-based, indigenized and bioregional education; climate change and disaster risk reduction education; and education for sustainable development. Arising from these strands and their interface, six questions are asked of the examples of island practice reviewed. A final section asks what is distinctive about environmental education on islands and comes up with five principal findings. First, it is observed that environmental education initiatives on islands are markedly eclectic in their rich blending of practice from within the different strands. Second, it is noted that environmental education practice on different islands, especially in the Pacific, is marked by a return to indigenous, community-based learning. Third, the emergence of a distinctive pedagogy is remarked upon, especially the greater weighting given to relational, socio-affective and action-orientated learning. Fourth, the paucity of inter-island cosmopolitan dialogue is noted and questions are asked about how to ensure island learners steeped in learning about place can be brought to connect with the global environmental problematic. Fifth, the frequency of cross-curricular, interdisciplinary, even trans-disciplinary framing of environmental education initiatives is identified as bringing distinctiveness to island practice.

Keywords: environmental education, biodiversity education, conservation education, indigenous education, place-based education, education for sustainable development, climate change education, disaster risk reduction education, islands, curriculum, pedagogy

INTRODUCTION

This article reviews noteworthy practice in environmental education as manifest in island settings. The review is organized according to four broad strands of development in the field: conservation, biodiversity and science-framed education; place-based, indigenized and bioregional education; climate change and disaster risk reduction education; and education for sustainable development (ESD). Throughout, we refer back to six questions to be asked of island environmental education arising from discourse relating to the four strands and to their 'zones of overlap' (Sauvé 2005: 12). First, do learning programmes conceive of nature as having intrinsic or instrumental value? Second, what are the relative weightings given to cognitive learning (learning *about* nature), to experiential learning (learning *in* nature) and to affective learning (learning *with* nature that fosters emotional affinity with the natural world)? Third, is the learning action-orientated, providing a springboard for student environmental activism and community engagement? Fourth, does the learning take the student beyond the insular towards an expansive, even global, sense of environmental concern? Fifth, within what curriculum areas does environmental learning happen? Sixth, is interdisciplinary exposure to environmental concerns and issues achieved? In a concluding reflection, we ask what is distinctive about environmental education on islands.

The review is largely restricted to learning programmes for school-age students delivered within formal and/or non-formal contexts. It does, however, give some significant consideration to adult, community and teacher learning that is linked to formal and non-formal school-age programmes. It does not cover tertiary or early childhood environmental education on islands. It is not a policy study, although policy issues are indirectly addressed. Neither, in the strict sense, is it an evaluative meta-study, a quixotic task given the dearth of rigorous impact research into island environmental education initiatives. It is rather an appreciative review relying on what those on the ground hold to be impactful and durable initiatives. Beyond positive local sentiment, evidence of significant influence on the learner, and potential for wider relevance and take-up, no other criteria have been employed in determining the examples selected. We have, however, endeavoured to select examples from different regions and from the last fifteen years. No attempt has been made to comprehensively map environmental education practice on islands.

With a few notable exceptions, we confine our attention to small-island states and dependencies, including those islands described as 'small-island developing states' (SIDS). Small islands commonly face challenges of 'fragility, remoteness, natural resource limitations, vulnerability to external shock,

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susceptibility to natural disaster and dependence on international trade' (Sprague 2016: 52). Their 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 that both expose and foment the weakness of mainstream ideas, orthodoxies and paradigms' (Baldacchino 2006: 6). We look at island environmental education in such a light.

BIODIVERSITY, CONSERVATION AND SCIENCE-FRAMED ENVIRONMENTAL EDUCATION IN ISLAND SETTINGS

The Convention on Biological Diversity (CBD), promulgated at the Rio Earth Summit of November 1992, commits contracting state parties to including conservation of biological diversity in educational programmes (CBD 1993). At Rio, education and public awareness were identified as key strategies in positioning 'biodiversity as a key asset to be protected to ensure our well-being and that of future generations' (Navarro-Perez & Tidball 2012: 13). Responses to the call for biodiversity education have varied according to the enactor's understanding of what in the final analysis is a 'rather fuzzy or ill-defined' concept (Wals 2001). For many, and especially those working in the formal education sector, biodiversity education primarily concerns developing ecological literacy through the study of ecosystems, natural habitats, species diversity and species endangerment. As such, the disciplinary carrier has more often than not been the science curriculum. For others, learning that develops personal affinity with nature through local experience ('backyard diversity') and, hence, an active ethic of concern for the natural world is the primary focus. It is here that an intrinsic valuing of nature tends to be given most weighting. For yet others, having learners understand and critique economic and other anthropogenic drivers of biodiversity loss matters as much (Wals 2001; Selby 2017). As the spectrum of understandings unfurls, biodiversity and biodiversity loss take on a widening relevance across the curriculum.

With its natural environment conservation goals, biodiversity education has much in common with the longer-standing field of conservation education (Navarro-Perez & Tidball 2012). With islands frequently identified as critically important 'biodiversity hotspots', island environmental education often foregrounds local biodiversity and conservation issues and so overlaps with place-based education, as reviewed in the next section.

Looking at localized biodiversity and conservation education on islands within the formal school sector, we offer examples of three strategies: island education centres serving as a focus for biodiversity learning; curriculum materials and learning approaches collaboratively developed by island agencies before becoming part of formal school provision; and web-based learning materials developed for schools to overcome the problems of distance, remoteness and cost often besetting small islands.

In Cyprus, biodiversity learning programmes for students and associated training for teachers are being provided by a network of environmental education centres funded and organized by the Cyprus Pedagogical Institute, the curricular arm of the Ministry of Education and Culture. Through these programmes, now embedded in a reformed national curriculum, primary, secondary and vocational students 'have the opportunity not only to learn, feel and sensitize about the biodiversity of a place, but they have the opportunity to interact with the local populations and collect information which is connected to the social and cultural aspect of the biodiversity of place' (UNESCO 2012a: 41). There is a strong emphasis on intergenerational participation, with parents and other local community members actively involved. The programme has three phases. It begins with a classroom-based introduction to biodiversity issues using active learning approaches. Its second, centre-based phase involves direct student involvement in fieldwork at important sites (botanical gardens, forests, areas experiencing desertification) and through direct engagement and interaction with local people. The third, action phase involves students participating in conservation and awareness-raising projects from their school base. The key strengths of the Cyprus approach as seen by the organizers are its out-of-school, in-field dimensions, its involvement of local adult populations and its holistic framing of biodiversity issues (UNESCO 2012a: 43).

The Cayman Islands offer a noteworthy example of a conservation and biodiversity learning initiative developed out of a local academic, governmental and non-governmental collaboration before becoming embedded in the school curriculum. *Marvellous Mangroves in the Cayman Islands* (Keeley 2000) introduces students to the fauna and flora that make up a mangrove habitat, explores mangrove ecology, looks at destructive human impacts on mangrove swamps and looks at what peoples and communities can do to best protect and preserve mangrove habitat. The curriculum begins with familiarization lessons in the classroom prior to a field trip (on land, by boat or using snorkelling) to be followed up, back in class, with post-trip investigation of species found in water samples, consideration of food chains, food webs and mangrove degradation and determination of mangrove-protective behaviours. For each part of the programme, a range of hands-on activities has been developed. Programme development – by the Mangrove Action Project and partners – involved field-testing for cultural and student appropriateness as well as ensuring alignment with the learning outcomes set out in the Cayman Islands primary and secondary curricula. Essentially a tool for the science curriculum, *Marvellous Mangroves* also includes learning activities for social studies, language arts, mathematics, drama and art (Keeley 2010). The guide has recently been reissued to teachers throughout the Cayman Islands, for whom professional development workshops have been made available (Cayman Islands Government n.d.). The programme has proved transferable to a range of island and continental coastal nations possessing a mangrove shoreline.

The drive for a localized biodiversity education focus can, in part, be fuelled by the desire to shake off remnants of colonial attachment within the formal school curriculum. Such is the case in the Falkland Islands and Ascension Island. The schoolchildren of these two UK Atlantic overseas territories long followed a curriculum that, particularly in its learning materials, felt 'foreign': 'Badgers, squirrels and foxes living in British woodland areas are great but not entirely relevant' (Liddle *et al.* 2007: 306). To counteract this, conservation officers enlisted the support of environmental scientists and educators to design localized biodiversity materials focusing on terrestrial and marine fauna and flora such as the king penguin, the sooty tern and Commerson's dolphin. The materials comprise lesson plans, in-class and outdoor activity packs, identity factsheets on local species (used for work on species classification and food webs), habitat posters, posters illustrating biological processes in local species, slide sets and a species photo-database. They have been developed to align with the National Curriculum for England and Wales so that island children are, for example, surveying contrasting local environments in grade 2, studying habitats in grade 4 and investigating natural features and ecological systems in grade 6, but all now with a distinctively local focus (Liddle *et al.* 2007). As we shall note in subsequent sections, a pushing back against cultural neo-colonialism also inspires the restoration of indigenous environmental learning on many, especially Pacific, islands.

Bringing local biodiversity to children within formal learning programmes presented a different kind of problem in the scattered archipelago of the British Virgin Islands (BVI). Schools are spread across four islands and no curricular or logistical provision exists to allow students to experience the environments of islands other than their own. To circumvent the problem and to 'engender a comprehensive understanding of the environments of BVI' (Woodfield-Pascoe *et al.* 2007: 289), various governmental and non-governmental organizations shared resources and expertise to develop a BVI *Environmental Atlas* in software form in order to support primary and secondary schools and students in environmental education projects. CDs were distributed in multiple copies to all BVI schools, alongside computers and poster-form learning support materials. Teacher training is regularly offered, with the Department of Education ensuring alignment of the *Atlas* with its social studies curriculum. Key to the success of the project, team members aver, has been its 'collaborative nature', meaning that different team players have pooled data, photographs of fauna, flora and topographical features, geographic information system maps and local knowledge to make the compilation of the resource relatively easy. 'These,' team members suggest, 'are important lessons for all small island systems with limited financial resources, widely distributed populations, but a wealth of environmental resources' (Woodfield-Pascoe *et al.* 2007: 293).

The 'island continent' of Madagascar, a 'biodiversity hotspot', is home to a learning initiative straddling and conflating formal and non-formal school-age learning with a community learning dimension. With over 90% of forest wildlife endemic to the island but facing a very high threat to its natural forest heritage, Madagascar has experienced a 'long history of neglect of biodiversity within the main educational system' (Dolins *et al.* 2010: 392). Compounding the problem of conserving the forests are both high levels of poverty and the location of the bulk of the human population far from the forests with no connecting roads. The forests are a 'distant frontier' for most Malagasy people. The situation has left non-governmental organizations playing a pivotal role in conservation education, targeting children and adults from villages lying close to the forests. The International Research and Training Centre for the Valorization of Biodiversity near Ranomafana National Park in Madagascar's south-eastern rainforest has adopted a strategy of targeting and engaging children in and out of school, as well as adults from particular communities, with a view to modelling approaches that might be followed by other communities. An 'outdoor classroom' approach focuses on valuing biodiversity, conservation, reforestation and health. Alternatives to slash-and-burn forest destruction are practiced; under a *Children and Trees Growing Together* programme, children and adults learn about forest ecosystems, look after seed nurseries, reforest areas around schools and villages so as to create a 'living laboratory' and cultivate model botanical gardens of plants that are vital to lemurs and other endemic species. Core to the work of the Centre is helping 'local people understand the value of the rainforest and the need to protect it while also improving their standard of living' (Dolins *et al.* 2010: 397). For the many out-of-school youngsters in the villages involved, Conservation Clubs have been established where, working alongside adults, children and youth learn about endemic species and beneficial medicinal plants in the forests while engaging in forest-friendly agricultural practice. The approach of the Centre thus brings together in-school students – 15 project schools follow a 9-month curriculum in biodiversity and reforestation – and out-of-school children and youth who, in tandem with community members, work on reconciling biodiversity conservation with rural development and, hence, poverty reduction (Dolins *et al.* 2010: 395).

PLACE-BASED, INDIGENIZED AND BIOREGIONAL ENVIRONMENTAL EDUCATION IN ISLAND SETTINGS

As ocean-bounded entities, in many cases remote and with small, scattered populations, islands are particularly well advantaged to benefit from place-based approaches to environmental education. This is especially so in the case of islands where indigenous cultures continue to flourish, where perception is still largely informed by a worldview that conceives of place immersion as central to ways of knowing and being. Islands are thus emerging as fertile contexts and exemplars for place-based, indigenized environmental education.

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Place-based education takes as its purpose the attunement of the learner to the specific features and rhythms of near-at-hand place through learning content that is at one and the same time geographical, geological, ecological, cultural, linguistic and sociological. Bioregional education shares an overlapping purpose but takes as its focus a larger, oftentimes boundary-transcending area distinguished by common geological and natural features within which learner inhabitants absorb a 'terrain of consciousness' (Traina 1995: 1, 4). Key to both approaches is 'seeing human beings as one part of the natural world and human cultures as an outgrowth of interactions between our species and particular places' (Smith & Williams 1999: 3). An 'ineluctable relationship' is seen to exist between specific bio-systems and cultures, something that much environmental education with a largely unwavering concentration on the former has tended to overlook (Smith & Williams 1999: 4). The cultivation of deep affiliation and affinity with place carries the promise that learners will not only come to care for and be ready to protect place, but also that they will acquire a dilated sense of environmental attachment and concern 'that goes beyond the particularities of habitat' (Orr 1994: 137).

Long pushed to the peripheries by a hegemonic Western educational paradigm, indigenous approaches to learning are now garnering increasing attention. Built upon a worldview that embraces the interconnectedness of everything, the primacy of community and the importance of animate and inanimate place in meaning-making, indigenous learning has long used place-based engagement, story, art, music and demonstration, especially as guided by elders, to exemplify ways of living sustainably (Kawagley & Barnhardt 1999). On islands in many parts of the world, the revival and revitalization of indigenous knowledge and learning (traditional ecological knowledge or TEK) has coincided with the reassertion of place-based learning aimed at acculturating an environmental ethic (Selby 2017).

Vanuatu is a case in point. A national curriculum statement, *Working Together for a Better Future*, calls for a curriculum 'based on values derived from Vanuatu's cultures and beliefs,' delivered in part through vernacular languages (Vanuatu Ministry of Education 2010: iii). The values identified include appreciation and care for the natural environment. The statement recognizes 'the effectiveness of our traditional ways and how these have been transmitted by our ancestors. Classroom practitioners should call upon local people with the necessary expertise to come to school and teach traditional knowledge to the children and students' (Vanuatu Ministry of Education 2010: 12, 14, 18, 19). In the same year, the Vanuatu National Cultural Council issued a series of teacher guides, one for each of grades 1–6: *Teaching Indigenous Knowledge and Resource Management in the Primary School*, an outcome of the UNESCO-LINKS (Local and Indigenous Knowledge Systems) project. The introduction to each guide emphasizes the importance of having children explore 'conceptual and linguistic ways of organizing' indigenous environmental knowledge, of complementing Western scientific knowledge as taught in school with traditional knowledge and of having adult members of communities familiarize students with traditional local knowledge and resource management (Baereleo 2010: 5). The bulk of each guide is given over to advice on how the teacher can embed indigenous knowledge within the school environmental science curriculum at each grade level. The emphasis throughout is upon students resorting to local community members to learn, in vernacular, the names of plants and animals, while also learning about seasonal shifts in the environment, becoming familiar with traditional beliefs and rituals attached to plants and creatures in the locality, listening to stories and songs connected to local nature and internalizing a 'sense of obligation' in their relationship with the island environment (Baereleo 2010: 5, 15). The guides, used in primary schools from 2011 onwards 'represent an innovative means of increasing intergenerational TEK transmission' (McCarter & Gavin 2011: no pagination). These promising developments notwithstanding, concerns remain regarding whether the constraints of a formal schooling system built on Western lines and largely informed by a Western-derived worldview present too many 'practical and epistemological barriers' to a re-flourishing of indigenous learning and as to whether alternative, non-formal sites for indigenous environmental knowledge transmission are also needed (McCarter & Gavin 2011: no pagination), both of which are issues that will be returned to later.

It is noteworthy that the Vanuatu school initiative seeks to conflate indigenous, place-based knowledge and learning with Western knowledge and learning through an approach enlisting significant community engagement. In the Marovo Lagoon area of the Western Province of the Solomon Islands, efforts have similarly been made to redesign school science content to incorporate indigenous but at-risk knowledge systems, again with a strong community dimension. As in the case of Vanuatu, those efforts have taken place against a backdrop of national governmental commitment to a re-anchoring of basic education in community and to learning programmes that preserve indigenous knowledge and skills (Hviding 2006).

Marovo is 'internationally recognized as an area of extraordinary biological and cultural diversity currently facing a range of environmental threats' (Hviding 2006: 3). In 2005, *Reef and Rainforest: An Environmental Encyclopedia of Marovo Lagoon, Solomon Islands* was launched as the first publication in the UNESCO-LINKS *Knowledges of Nature* series (Hviding 2005). Written in both the Marovo language and English, the *Encyclopedia* describes the fauna, flora and topographical features making up the lagoon environment, while also depicting the lives and livelihoods of the people living there. Its organization and grouping of fauna, flora and environmental features faithfully adheres to the indigenous scientific logic and worldview of Marovo villagers. In September 2005, the *Encyclopedia* was used as the springboard for a pilot project in which 8- to 16-year-old students in seven participating primary and secondary schools having Marovo as their primary language chose as their

particular assignment a species or environmental phenomenon covered in the book and went out to meet village adults and elders to learn more. Students worked individually or in groups; one-page narratives were written in vernacular language, often accompanied by drawings or graphics, and presentations and discussions took place back in class. There was an altogether 'unprecedented involvement and effort by teachers, students and community' and a 'good range of indigenous knowledge about environmental phenomena in the Marovo area was documented for the first time' (Hviding 2006: 7). There were 'fascinating student assignments about different species of fruit bats, certain little-known medicinal plants, the culturally central *Canarium* nut tree, the elusive but culturally significant sea mammal dugong (*Dugong dugong*), and other topics not covered in detail or indeed missing altogether from the *Encyclopedia*' (Hviding 2006: 8).

The pilot project has evolved into the ongoing development of interactive wiki-format educational resources allowing students to add to and modify content in the form of new data, images and video. Lesson plans, teacher guidance and student assignments have been made available online so the approach can be used across the Solomon Islands and in multiple subjects within the national curriculum matrix (UNESCO 2011). It has thus come to form an important plank in the national vernacular education initiative.

The Marovo initiative marries place-based and indigenous learning with science-framed conservation and biodiversity learning. It points to ways in which environmental learning can spread out from a primarily science base.

It also demonstrates how island schools can serve as hubs for community environmental education and activism and how schools can actively support and maintain a dynamic of engagement with the local community. It speaks to a quite radical, transdisciplinary departure from what 'school learning' has generally come to connote.

In Palau, a Micronesian archipelago of some 340 islands, efforts are being made to revive place-based stories by engaging high school students with the Ngardok Lake area, a designated protected site. Holding the notion of conservation to be a Western construct, the approach has been to give primary focus to reviving legends of place as progenitors of respect and care for place. Students listen to traditional place-based legends as recounted by community cultural historians while also learning about invasive species, working on reforestation projects and engaging in bird watching to understand birds as bio-indicators of ecological health (Penland 2016). The Palau endeavour is but one example of a return to indigenous ways of transmitting knowledge being fostered by Pacific Resources for Education and Learning (PREL), a non-profit organization serving the education sector primarily in US-affiliated Pacific islands. PREL has co-developed place-based learning strategies and resources across several islands as part of its Pacific Islands Climate Education Partnership. Its practical teacher guide, *Place-based Education: Elements of Design*, arranges learning activities around four 'big ideas':

- Place includes both the environment and its people. A place is rooted in culture and shapes identity.
- The study of place requires the combination of intellect and experience ('we need to engage in multiple ways of learning').
- Place, by definition, is specific and contextual (and calls for emotional and spiritual as well as biophysical engagement with a particular place).
- A place is a living, dynamic system and is part of other systems (Barros & Wei Koh 2015: no pagination).

The approach is deeply informed by indigenous ways of knowing: multisensory learning, learning that connects with the numinous, frequent exposure to multiple learning experiences outside of school, drawing upon learner and elder autobiographical memories of place, relational modes of perceiving and the fusing of cultural expression with nature connection. For its advocates, such 'place-based education is education for sustainability' (Wei Koh 2016: 43), an issue that we will return to later.

Another distinctive PREL initiative has been the 2016 launch of the Pacific Storytellers Cooperative, a website platform for indigenous place-based stories that seeks to establish 'the nexus between oral traditions of island communities and present-day modalities of communication, especially among Pacific youth' (PREL 2015: no pagination). The Cooperative is seen as a means of exposing children and youth to traditional stories through a medium to which they easily relate, while also encouraging the submission of new stories by young people (PREL 2015).

CLIMATE CHANGE AND DISASTER RISK REDUCTION EDUCATION IN ISLAND SETTINGS

Against a backcloth of quickening incidence and increasing scale of climate breakdown and natural disaster, two new strands of issue-based environmental education have gained significant traction: climate change education and disaster risk reduction education. Islands most vulnerable to the impacts of climate change and most at risk from natural disaster have been at the forefront in these developments.

The Maldives, an archipelago of threatened, low-lying small islands with fragile ecosystems, has long recognized the importance of raising mindfulness of environmental threat, with environmental education becoming part of the national curriculum in 1984. In a succession of stages, the issues of climate change adaptation and natural disaster risk reduction were integrated into the existing environmental education curriculum between 2003 and 2009. Mindful that earlier delivery of environmental education had been characterized by rote learning for examination purposes, it was determined to develop an activity-orientated, 'child-friendly' environmental resource pack enabling children to familiarize themselves with local biodiversity while deploying practical tools to monitor wind, tides, coral health and climate change effects. One major obstacle to effective use of the

pack has been low teacher capacity for facilitating child-centred active learning approaches, something that continues to be addressed. Another is the inappropriateness of what are generic guides for those islands in the archipelago with distinctive ecosystems (UNICEF 2012). Paralleling climate change education developments was an United Nations Development Programme/Ministry of Education initiative to embed disaster risk reduction learning across the grade 1–9 curriculum through the development of teacher guides and student books (Selby & Kagawa 2012: 181).

In the Caribbean archipelago, school-based climate change and disaster risk reduction education is supported in the 16 English-speaking countries by means of a *Disaster Risk Reduction Education Toolkit*, a resource published by the Caribbean Disaster Emergency Management Agency. The *Toolkit* contains primary and secondary child-centred activities on climatological and geo-seismic hazards, climate change and resilience building. Importantly, there are also learning activities to help children cope with post-disaster trauma. The approach embraces looking at the science and mechanisms of natural hazards, practising safety measures, understanding the drivers that morph hazards into disasters and building resilience through processes of adaptation. The programme frequently takes the students out of class for fieldwork to engage with adults in practical projects on school and community disaster vulnerability and capacity mapping allied with advocacy and adaptation initiatives (Selby & Kagawa 2014a).

In Fiji, what began in 2005 as a project aimed at reducing children's vulnerability to earthquakes has evolved into a fully-fledged disaster risk reduction cross-curricular initiative going through the primary and secondary grade levels and covering, *inter alia*, cyclones, flooding, landslides, wildfire, earthquakes and tsunamis. In history lessons, students research into past natural disasters in their community; in health lessons, they explore emotional responses to disaster experiences and threats; in art lessons, they depict their experiences of natural hazards; and in geography lessons, they look at hazard mitigation and prevention (Selby & Kagawa 2012: 94–95).

The Sandwatch project conflates climate change adaptation and disaster risk reduction learning through an approach that traverses formal and non-formal education. Formally launched in 2001 in the Caribbean, it has spread to some 50 countries, including island nations in the Pacific and Indian oceans. It brings together children, youth and adults, supported by teachers, local community and non-governmental organizations in fostering ecosystem resilience and climate change adaptation with a focus on beaches and other coastal environments. Those involved work together using a four-step 'hands-on' methodology that encompasses monitoring, analysing, sharing and taking action. Project participants regularly monitor a designated local beach environment, looking, for instance, at beach erosion, accretion and composition, fauna and flora, water quality, human activities, debris, waves and currents. They compile information into tables, graphs and charts as part of analysing trends before communicating results locally through meetings, storytelling, drama and using other social and traditional media. Sandwatch teams then plan and implement change and advocacy activities to strengthen beach environments as a means of promoting climate change adaptation. For instance, in the Cook Islands and the Bahamas, Sandwatch teams replanted the native vegetation on the beaches damaged by hurricanes to aid beach recovery and reduce future sand erosion, while in Saint Vincent and the Grenadines, the Sandwatch group helped restore a degraded coastal area by campaigning to stop local fishermen from polluting the beach. Schools have been much involved in Sandwatch projects, with the manual offering multiple opportunities for linkages to the curriculum (Cambers & Diamond 2010). This climate change adaptation/disaster risk initiative very much shares a 'zone of overlap' with conservation and biodiversity-based environmental education as considered earlier, and also contains a strong place-based education element.

Sandwatch has forged an active network of participating countries, and it is worth noting that climate change adaptation and disaster risk reduction education, both deemed high and urgent priorities, have led to significant inter-island networking endeavours. The Pacific Islands Climate Education Partnership is a case in point. Its programmes and materials bring together modern scientific and local ecological knowledge, adding place-based environmental education to the mix and thereby enabling students to understand climate change adaptation and mitigation needs through the lens of their own place.

EDUCATION FOR SUSTAINABLE DEVELOPMENT IN ISLAND SETTINGS

In the last 30 years, the idea of sustainable development has come to be widely heralded as the optimal means of addressing the multiple and interrelated environmental and socioeconomic challenges the world faces. Famously defined as 'development that meets the needs of the present without compromising the ability of future generations to meet their needs' (World Commission on Environment and Development 1987: 43), it is generally depicted as a process of maintaining a dynamic balance between the three mutually impacting 'pillars' of economy, environment and society as the development process is taken forward, thus staying within the 'carrying capacity' of the planet. At the 2014 conference wrapping up the UN Decade of Education for Sustainable Development, ESD was declared to be the 'enabler for sustainable development' with the potential to 'empower learners to transform themselves and the society they live in' (UNESCO 2014a). In the *Global Action Programme on Education for Sustainable Development*, designed as the roadmap for the post-2015 ESD agenda, learning for informed decision-making and responsible action

in pursuit of environmental integrity, economic viability and a just society was underlined, as was the idea of ESD as providing an overarching framework for a range of historical and current 'adjectival' educations such as environmental and development education (UNESCO 2014b). Environmental education was thus depicted as being subsumed within ESD discourse.

Such a perception has not gone unchallenged amongst environmental educators. A number critique the instrumental (resource) conception of environment in ESD discourse, with its recurring reference to notions such as 'natural capital' and 'ecosystem services' (González-Gaudiano 2005; Sauvé 2005; Selby 2017). They also critique the lack of clarity and diffidence in ESD circles as to whether or not 'sustainable development' connotes continued economic growth, which they regard as destructive of both ecosphere and ethnosphere (Selby & Kagawa 2014b; Berryman & Sauvé 2016). Others refer to the 'de-natured' nature of ESD, where references to nature and the natural world are limited and decidedly anthropocentric in tone (Selby 2017).

In the SIDS context, the emergence of governmental sustainable development policy and strategy documents has not been paralleled by the emergence of ESD-specific documentation (Crossley & Sprague 2014). Also, according to a study of ESD implementation in ten SIDS, in countries where sustainability education has been integrated into national education policy, strategy and planning documents, actual implementation at school and classroom levels remains weak. ESD is considered as an 'add-on' to the curriculum or, its broad, multidisciplinary framework notwithstanding, it is simply integrated into science classes (Hiebert 2013).

An increasingly prominent ESD strategy being employed in the formal education sector around the world is the 'whole-school approach'. Its purpose is to embed sustainability principles into all aspects of the school – policy, governance, operation, curriculum and learning programmes and co-curricular activities – through securing school- and community-wide participation. The overarching aim is to help students acquire not only sustainability-related knowledge, but also to become immersed in a sustainability ethic through continually reinforced school experience (Wals 2009; UNESCO 2012b). Eco-Schools Indian Ocean, an initiative linked to the international Eco-School programme run by the Foundation for Environmental Education (FEE), helps schools integrate ESD into multiple aspects of school life and school relations with the community. Island nations and jurisdictions involved are the Comoros Islands, Madagascar, Mauritius, Réunion, the Seychelles and Zanzibar. The Eco-Schools Indian Ocean programme, identified as a lead partner in UNESCO's *Global Action Programme* for ESD, addresses ten themes: energy; water; waste; biodiversity; healthy living; livelihoods; soil and air; cultural heritage; climate change; and ocean and coast. Each participating school follows the simple seven-step methodology developed by FEE: establishing an Eco-School committee; informing and involving stakeholders widely; conducting a school environmental review; developing an eco-code outlining the school's commitment; integrating Eco-School themes into the curriculum; developing a school action plan; and conducting monitoring and evaluation. The programme also facilitates links among participating schools across the region for collective action on common challenges. Participating schools in the Indian Ocean region are also linked to the international Eco-Schools programme network (Emilie 2015a). The Seychelles has conducted its own Eco-School programme since 1994, a programme now institutionalized in all state schools. In primary and secondary schools, environmental education is taught across the curriculum to reinforce holistic understanding of the environment and environmental issues. Young Seychellois are also given a number of co-curricular opportunities for environmental learning and action, such as through wildlife clubs, school gardens, national campaigns, festivals, competitions, fieldwork, environmental projects and outdoor activities. Each school has an identified eco-leader. Designated as an eco-school programme from its inception, the approach is now characterized as falling under the ESD umbrella (Emile 2015b).

In examining manifestations of ESD in island settings, the issue of appropriation is germane. Hiebert (2013: 9) notes that because ESD is closely related to contemporary thinking on what constitutes 'good education', because of the insistence on locally relevant practice and because of the breadth and scope of what is considered ESD, 'there is a risk of dilution in which almost any educational act could be considered ESD.' In critically examining the relationship between ESD and environmental education, Berryman and Sauvé (2016: 112) point out that diverse socio-ecological initiatives have been 'simply reframed, reinterpreted and renamed as ESD.' Examples of this include the biodiversity education initiative in Cyprus and the Sandwatch project discussed earlier, as well as the Eco-Schools Indian Ocean.

Critical questions in considering environmental education on islands include whether the ESD agenda emerging from the international community has brought about anything new, whether it is locally and culturally relevant and whether ESD is eroding island distinctiveness through its exogenous proposals and programmes. When small-island states are highly dependent on foreign development aid and island governments are under pressure to adopt educational strategies tied to aid (Thaman & Thaman 2009; Crosssley & Sprague 2014), the temptation to accept exogenous programmes that are indifferent to indigenous and traditional communitarian approaches becomes stronger.

Amongst educators in the Pacific region, there is pushback against ESD and its Western epistemology and value systems. For such educators, a reconceptualization of ESD based on distinct Pacific cultures is a necessary prerequisite for successful learning and teaching. For many Pacific people, sustainability is an indigenous concept closely linked to environmentally sustainable livelihoods, 'cultural survival and continuity' (Thaman & Thaman 2009: 63), rather than economic development, with its associated anthropocentrism.

Cultivating harmonious relationships with other people and with nature is the most important value underpinning most Pacific indigenous knowledge systems, and therefore understanding appropriate individual and collective roles in relation to their society and to the island environment is an important learning outcome of indigenous education (Thaman & Thaman 2009). Developing distinctive pedagogies grounded in indigenous knowledge systems is thus vital in island settings. In this regard, the Sustainable Livelihood and Education in the Pacific project piloted in Tonga is noteworthy. In the project, Tongan local researchers explored Tongan conceptualizations of education and sustainable livelihoods using methodologies based on traditional local ethics and epistemologies. This project has gone on to inform the development of the new draft Tongan national curriculum, *Quality Schooling for a Sustainable Future* (Hiebert 2013).

SOME ARCHIPELAGIC REFLECTIONS

As was made clear at the outset, this study is neither a policy analysis, nor an evaluative meta-study nor a comprehensive mapping exercise. Those remain for the future. But, from our appreciative review, we draw some important insights regarding what is distinctive about environmental education on islands.

First, our review of practice reveals a markedly eclectic tendency. Island environmental education initiatives present a blend drawn from the different broad strands of theoretical discourse and educative practice around which we have organized this review. No specific island project or programme remains exclusively corralled within any particular strand, whatever its chosen label. This looks to be healthy eclecticism in that, in the final analysis, the strands are all underpinned by a common focus on the state of the environment and the human–environment relationship and are all informed by the assumption that learning that connects students to the environment can foster enhanced levels of environmental care, concern and activist engagement. The 'zones of overlap' between strands are painted with a generously broad brush in island environmental education practice.

Second, our exploration of practice suggests that islands offer a rallying point for an alternative expression of sustainability-related education framed not, as ESD tends to be, by Western epistemological, knowledge and value systems, but by vernacular ways of knowing and explaining. In this regard, the Pacific region points the way with moves afoot to bring a local focus to bear upon environmental issues, taught through local languages, informed by indigenous perspectives and explanation and with community elders fulfilling in-school and out-of-school support roles (Thaman & Thaman 2009). The problem remains that school experience, under Western influence, continues to be dominated by compartmentalized curricula, in-classroom learning and individualized intellectual as opposed to relational socio-affective learning, all of which go against the grain of indigenous culture and its understanding of immersion in nature – being in and with nature – as core to cultural well-being. For this reason, environmental learning initiatives that both temper and enrich schooling by straddling both the formal and non-formal, such as the Vanuatu and Solomon Islands examples cited earlier, are path-finding. Engaging in-school students with out-of-school children and youth and with the adult community in out-of-school settings needs to be a key plank in any indigenous pushback.

Third, and recalling our first three introductory questions, a distinctive pedagogy for environmental education on islands appears to be emerging. While all of the pedagogical approaches reviewed here can be found in non-island settings, especially in non-island countercultural expressions of environmental education, there is an argument to be made that the weighting given to different pedagogical approaches on islands is, in many cases, markedly distinct. The remoteness of some islands, as well as the distance of some communities from seats of power and influence, seem to give latitude for greater pedagogical diversity with, for example, more provision of field-based and action-orientated learning. Student engagement in local enquiry-based projects and change agency/advocacy projects alongside adult members of the community seems to be a more regular occurrence in island settings. We have noted examples from Cyprus, Madagascar and the Solomon Islands, as well as in the Sandwatch and Indian Ocean Eco-Schools initiatives.

The revival of indigenous knowledge, with its emphasis on emotional and spiritual connection with nature, is also helping foster a renaissance in affective forms of learning linked to the island *genius loci*, while the attraction of place-based learning in bounded environmental settings is encouraging revitalized forms of experiential and immersive nature learning. Use of story, song and legend as part of the Pacific Resource for Education and Learning initiative also falls into the same picture of a rebalancing away from heavily cognitive and cerebral learning approaches and towards active and affective learning. Within this reweighting of approach, a pedagogy of intrinsic valuing of nature is in gestation.

Fourth, what are so far rarely evident are curriculum opportunities and associated pedagogies that enable students on islands to engage in cosmopolitan dialogue with students on islands elsewhere, a point that was raised by our fourth introductory question. This has become possible with the ubiquitous availability of Internet connectivity, and one can imagine students comparing notes on island conditions and exchanging accounts of their local conservation action projects. Put more broadly, there is an issue about how to create outreach from entirely admirable place-based learning ventures so that both identification with and committed concern for the global environmental problematic is also fostered, so that the locality is not 'a perimeter but an aperture: a space through which the world could be seen' (Macfarlane 2015: 62).

Finally, let us address our fifth and sixth introductory questions. Across the school-based examples of noteworthy environmental education practice that we have appreciatively

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reviewed, one can discern a shift towards cross-curricular treatment of environmental themes. While science, in many cases, remains the starting point, we have described several examples of a widening circle of curricular treatment in island schools. Even though the rhetoric of interdisciplinary treatment is commonly found in environmental education discourse, it is less common to find cross-curricular practice quite so thick on the ground as on islands. This speaks to another rather distinctive trend in island environmental education. The school environmental curriculum is becoming less bounded and more archipelagic in quality. With more island environmental learning happening outside of school and in the community, we can even dare to begin talking about a shift beyond the interdisciplinary and towards the transdisciplinary.

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CONFLICT OF INTEREST

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ETHICAL STANDARDS

None.

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