Review

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Environmental Stewardship in Tuvalu Formal School Education—A Policy Analysis Perspective across Scales

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Abstract: The article adds new policy insights to the way in which formal teaching methods of environmental stewardship education areas are evaluated in Tuvalu. We aimed to answer three questions: 1. What are the formal policies shaping environmental stewardship education in Tuvalu? 2. Are national educational and environmental policies mutually consistent? and 3. Are these national policies consistent with regional and global policies? These questions were addressed using a study of Tuvaluan online-available documentary assessments of national policies, frameworks, and curricula in conjunction with those obtained from the Education Department. Our findings revealed limitations and weaknesses regarding the provisions of environmental stewardship education at the national scale, including misaligned curricula, policy documents, and formal educational provisions with Tuvalu's national environmental policy. We also found inconsistencies with regional and global policies such as the Pacific Islands Framework for Nature Conservation, the Framework for Resilient Development in the Pacific, and international strategic plans for biodiversity and climate change. These cross-scalar policy weaknesses and limitations highlight the need for the Tuvaluan government to align educational and environmental policies at different scales. We recommend a multi-pronged strategy where modes of informal environmental education can support and complement formal government policymaking on education and the environment.

Keywords: environmental stewardship; formal school education; policy analysis; Tuvalu; national educational policies; environmental policies; curriculum alignment; policy consistency; regional policies; global policies

1. Introduction

Tuvalu is the world's fourth-smallest country, with a population of roughly 11,000 people, a land area of only 25.9 km^2, and a 900,000 km^2 exclusive economic zone. It consists of five coralline atolls (Nanumea, Nui, Nukufetau, Funafuti, and Nukulaelae), three table reef islands (Nanumaga, Niutao, and Niulakita), and one composite (coralline atoll/table reef) island (Vaitupu) (Figure 1). Islands and atolls rarely climb higher than 3 metres above sea level, an attestation of Tuvalu's vulnerability to sea-level rise, erosion, saltwater intrusion, inundation, and storm surges associated with cyclones [1]. The 2021 Commonwealth Universal Vulnerability Index (UVI) shows that Tuvalu had an index of 0.97 for UVI_1 in 2018, which signifies its vulnerability to external and natural shocks, climate change, and socio-political or societal fragility partially matched by its structural and policy resilience. According to UVI_2, Tuvalu is among the thirty most vulnerable countries in 2018 [2]. Based on the 2021 World Risk Index, Tuvalu's atoll neighbour, Kiribati, is among the twenty countries at risk for natural disasters with the lowest adaptation capacity [3]. Tuvalu would have been on the

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same risk level had it not been due to excessive missing vulnerability values. In June 2024, Tuvalu had an estimated population of 11, 478 [4], of whom an estimated 50.4% resided in Funafuti, the capital of Tuvalu [5].

Figure 1. Tuvalu's atoll environment – East Funafuti. Source: Tuvalu National Adaptation Programme of Actions (NAPA II) Project, 2017.

The National Advisory Council on Climate Change (NACCC) and the Department of Climate Change and Disaster (DCCD) were established in late 2013 and 2014, respectively, as part of Tuvalu's reaction to the inevitable impacts of climate change [6,7] (p. 43; p. 3). The latter was once more divided into two significant departments: the Department of Disaster Management (DDM), which reports to the Ministry of Public Works, Infrastructure, Environment, Labour, Meteorology and Disaster (MPWIELMD), and the Department of Climate Change (DCC), which is currently under the Ministry of Home Affairs, Climate Change and Environment. Since then, the efforts of the DCC, the Department of Environment, the Department of Waste Management, the Tuvalu Fisheries Department, the Tuvalu Meteorological Service, and non-governmental organisations like the Tuvalu NGO, Tuvalu Red Cross Society, Tuvalu Climate Action Network (TuCAN), NGO/NPO Tuvalu Overview, Tuvalu National Council of Women, Tuvalu National Youth Council, Live and Learn Environmental Education Tuvalu, and Fuligafou has significantly increased public awareness of environmental protection and conservation, climate change adaptation and disaster risk reduction, albeit in silo. However, policies on formal schooling on environmental stewardship and horizontal implementation guidance between government departments and NGOs have been lacking. This article explores how formal environmental and educational policies are shaping practical environmental stewardship in Tuvalu, examining the various disconnections between formal and informal policymaking at national, regional and international scales. Theoretical and policy frameworks related to environmental stewardship education highlight the inconsistency of environmental and climate policy implementation in Tuvalu.

2. Theoretical and Policy Insights

2.1. Environmental Stewardship Education: Theoretical Insights

Environmental stewardship involves preserving, restoring, and using sustainable practices to improve ecosystem resilience and human well-being [8]. Bennett et al. [9] defined local environmental stewardship as protecting, caring for, or responsibly using the environment to achieve environmental and/or social outcomes in various social-ecological contexts by individuals, groups, or networks of

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actors with different motivations and capacities. The latter concept was adopted as this research focused on actors, capacity, and motivation, the three most critical characteristics of environmental stewardship. Individuals, local communities, CSOs, NGOs, and governments are involved. Local environmental stewardship may be promoted by horizontal policy integration. Environmental stewardship education through educational policy is essential because capacity—whether the actors listed can manage their resources—is a fundamental concern. Ethics, morals, beliefs, economic gains, increasing provisioning, etc., encourage actors to care for the environment. Government policies and other agency programmes can be deployed across the three elements, and sectoral uniformity and vertical alignment with global guidelines are essential for improving national outcomes.

Environmental stewardship (ES) and education are interdependent [10–12]. Education fosters environmental stewardship by raising awareness, providing information, and promoting responsible behaviour. Environmental stewardship is closely related to environmental education (EE), education for sustainability (EfS), education for sustainable development (ESD), place-based education (PBE), and community-based education (CBE) [13]. EE promotes environmental stewardship by educating individuals on the significance of the environment and the consequences of human actions [14]. ESD, EfS, and ES aim to promote sustainable practices and preserve the environment.

PBE involves learning about a place's local environment, culture, and history, while CBE involves learning about and engaging with the local community [15,16]. Both can promote environmental stewardship by nurturing a sense of community and environmental connection and responsibility. In Tuvalu, this occurs through the informal inter-generational transmission of traditional ecological knowledge, skills, and values that generally occurs through oral and practical informal means in village settings—peer-to-peer learning [17]. For effective ES, this needs to be incorporated into formal education curricula [17,18].

Environmental Stewardship Education (ESE) is rarely discussed in the literature. However, 'Stewardship Education' is commonly used in the literature and characterised as a process for creating an internalised stewardship ethic and abilities needed to make informed decisions and engage in environmental stewardship behaviours [19]. Seng [12] proposes that to attain environmental stewardship behaviour, the education programme should consider the student's progression from *entry-level* (environmental awareness and environmental knowledge) to *ownership level* (an in-depth understanding and identification with an issue) to *empowerment level* (purpose to act and personal responsibility), as depicted in Figure 2.

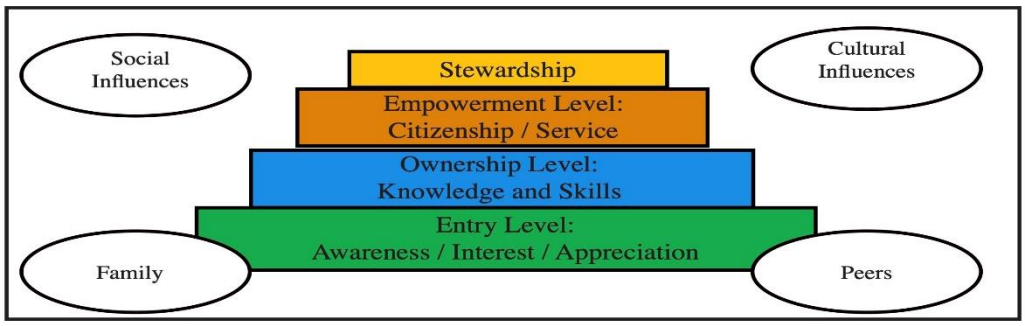

Figure 2. Progression toward environmentally responsible behaviour. Source: Seng [12].

This research draws on Thorne's [20] ESE definition, which considers the inclusion of care pedagogy in environmental and sustainability education programmes. Thorne demonstrates that ESE is a feasible educational strategy and explores where it is effective and how Tuvalu may benefit from it. It has also been posited that ESE is a crucial component of education in the Anthropocene [21], as it strives to develop the emotional and cognitive skill sets necessary to deal with severe environmental change and provide the foundation for an egalitarian and sustainable culture [13]. Furthermore, ESE is included in all formally recognised environmental education programmes, including EE, ESD, EfS, PBE, CBE, and climate change education (CCE) [13,22] (p. 22; p. 6).

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ESE is a tool to change students' attitudes and behaviours towards the natural environment, and formal education is the best medium for developing environmentally conscious citizens [23]. Formal education is essential for developing a literate and educated populace for the modern economy [24], allowing for developing skills, attitudes, and values for decent living and improved environmental behaviours [25]. Recent studies have shown that more excellent formal education significantly boosts individuals' public and private environmental behaviour [26,27]. Higher levels of formal education improve individuals' environmental knowledge and pollution awareness, influencing their environmental behaviour. However, there is a debate on where and how to situate formal ESE appropriately across formal educational timelines.

2.2. Environmental Stewardship Education Embedding Level: Theoretical Insights

Studies by Lutz et al. [28] and Striessnig et al. [29] argue that investment in universal primary and secondary education, especially in developing countries, is the most effective strategy for enhancing the adaptive capacity to climate change. Additionally, Havea et al. [30] explain the importance of tackling climate change from a young age. They contend that schools must teach younger children about climate change at a far younger age than only at the decision-making level of secondary education. They also argue that youngsters should know about climate change science to mitigate and adapt. Prabawani et al. [31] found that students' comprehension of eco-friendly education does not improve as their education level increases, suggesting that the elementary years of education are the best times to establish the groundwork for children's future desire to engage in environmental stewardship behaviours actively. Recent studies have found that young teenagers (12-13 years old) are perfect change agents crucial for public opinion, increasing scientific literacy, and using this information to advance climate-friendly policy and governance [32]. A 2017 study involving 401 12 to 13-year-olds found that they could also cognitively process elements of climate science that would enable them to develop a scientific understanding of the subject [33].

At the secondary level, Aklin et al. [34] found that income does not affect environmental preferences in Brazil and that education is a stronger predictor of environmental preferences. They argue that people with secondary schooling are more likely to support environmental views than those with primary education. Taylor et al. [35] agreed and argued that EfS should be implemented at the secondary level due to its potential to improve secondary students' knowledge and skills, leading to actions such as economic, social, and environmental justice [36]. Additionally, students are approaching voting age and becoming more independent and autonomous.

This study suggests that ESE should be introduced at the primary level, as most people in Tuvalu and other Pacific Island Countries only complete primary education [18]. This level of awe and wonder should be targeted for long-lasting impact [37].

2.3. Regional and International Policy Insights on Environmental Stewardship Education

Pacific island countries and territories are on the front line of climate change impacts, with climate change being viewed as a slow-acting disaster [38,39]. Therefore, climate change adaptation is a sub-set disaster risk reduction and is closely aligned financially and in terms of governance across the Pacific. An analysis of various Pacific regional and national guiding policy documents indicates a strong shift towards the integration of CCA and DRM/DRR policy since 2010 when Tonga led the region in the development of its Joint National Action Plan for CCA and DRR. The process of integration has been continuous (Figure 3) and led to the development and support of the regional Framework for Resilient Development in the Pacific (FRDP) 2017-2030, which is a set of voluntary guidelines for the Pacific region [40]. The FRDP promotes two types of integration: integrating climate change and disaster mitigation actions to reduce redundancy and maximise resource use and mainstreaming climate change and disaster risk action into development planning, policy, funding, programming, and execution. The FRDP (2016) is a "mainstreaming and integration" first for the Pacific and represents the region's global leadership in the recognition and advocacy of integrated resilient development. It should also be noted that ministers at the Inaugural Pacific Disaster Risk Reduction Ministers Meeting (Nadi, Fiji, September 2022) and the Asia-Pacific Ministerial Conference

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for Disaster Risk Reduction (APMCDRR, Brisbane, Australia, September 2022) recognised that DRR underpins sustainable development and provides the nexus for the 2030 Agenda for Sustainable Development, the Paris Agreement, the Agenda for Humanity and the New Urban Agenda. This integrated approach is very much reflected in the ethics of ES. The FRDP encourages formal and non-formal education systems to strengthen knowledge on causes, impacts, and responses to climate change, hazards, and disasters and capacity-building for adaptation and risk management measures.

Figure 3. Timeline of cross-cutting international strategies, conventions, and frameworks relevant to environmental stewardship in the Pacific. Source: Own composition.

At the international scale, the Kunming-Montreal Global Biodiversity Framework (KMGBF) 2022-2030 and its predecessor, the Strategic Plan for Biodiversity 2011-2020, are international frameworks for action by governments, subnational and local governments to halt and reverse biodiversity loss and enhance its benefits for people. The Framework encourages incorporating biodiversity into education programmes, promoting biodiversity conservation and sustainable use curricula in educational institutions, and fostering knowledge, attitudes, values, behaviours, and lifestyles consistent with living in harmony with nature [41].

In addition, the Sendai Framework for Disaster Risk Reduction (SFDRR) 2015–2030, the Paris Agreement of 2015, and the 2030 Agenda for Sustainable Development are other pertinent international frameworks that will influence national and local disaster risk reduction, climate change, and sustainability strategies. The SFDRR promotes disaster risk knowledge in formal and non-formal education, primary and secondary school resilience programmes, teachers' curricula material, and the idea that children and youth are agents of change [42]. The Paris Agreement is a global pact to limit global warming to well below 2 degrees Celsius, preferably 1.5 degrees Celsius, which calls on all parties in Article 82 to ensure that education contributes to the development of climate change resilience. The Global Goals and 2030 Agenda for Sustainable Development aim to end poverty and hunger, realise human rights, empower women and girls, and protect the earth and its natural resources. Target 13.3 of the 2030 Agenda requires incorporating climate change mitigation, adaptation, impact reduction, and early warning into primary, secondary, and tertiary curricula [43].

Furthermore, the Belgrade Charter and the Decade for ESD are educational frameworks and programmes that guide global quality education for environmental integrity, economic viability and just society. The Belgrade Charter outlines clear guidelines for environmental education programmes, including that it should examine the entire environment, be lifelong, be multidisciplinary, encourage environmental action, address significant environmental issues, address present and future environmental issues, consider environmental impact in all progress, and emphasise the importance of local, regional, and global environmental cooperation [44]. UNESCO

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drafted key characteristics of ESD, demonstrating that it should be interdisciplinary, holistic, and values-driven, promote critical thinking and problem-solving, employ multiple methods, encourage participatory decision-making, and be applicable and locally relevant [45]. These international guidelines should filter down to local government policies, such as the Tuvalu education policy.

ESE, EfS and ESD have been promoted through project-based and/or activity-based approaches [23,46,47]. According to Roofe and Ferguson [48], ESD and TVET are potent forces that can assist people in becoming active and environmentally responsible citizens, employees, and consumers capable of addressing local and global challenges. TVET was declared under the Bonn Declaration as the master key that can alleviate poverty, promote peace, conserve the environment, improve the quality of life for all and help achieve sustainable development [49]. ESD has been integrated into formal TVET curricula at the primary and secondary levels [48,50,51] in Tuvalu [52,53], but the integration of ESD and any other adjectival education, such as ESE, has not been explored.

This study draws on Roofe and Ferguson's [48] idea of infusing ESD and adjectival education into TVET curricula at the primary level. Further research is needed to understand the role of environmental stewardship in educational planning, policy, and practice [20]. This article compares the formal education objectives expressed in national, regional, and international policies to how environmental stewardship will be taught in Tuvalu's elementary and secondary schools in 2022/23.

Regional and international policies are essential to directing national and local policies for effective and improved national environmental stewardship education outcomes. The Pacific Islands Framework for Nature Conservation and Protected Areas (PIFNCPA) guides Pacific partners' conservation efforts, emphasising the need for coordinated Pacific-wide efforts to handle environmental issues and emerging threats to Pacific ecosystems, cultures, and economies [54]. The objectives of the PIFNCPA are to protect Pacific biodiversity and the natural environment forever, lead conservation and preservation activities of natural resources for present and future generations, and conserve nature and use resources sustainably. The PIFNCPA 2021-2025 and the FRDP 2017-2030 are two relevant regional guidelines that could link to the above Tuvaluan policy context.

2.4. National Policy Insights on Environmental Stewardship Education

Government policies are essential for encouraging economic progress and shaping society. For Tuvalu, these include the Tuvalu National Biodiversity Strategy and Action Plan (TNBSAP) 2012-2016, Integrated Environmental Policy and Natural Resources 2020-2022, Tuvalu NEMS 2022-2026, and *Te Vaka Fenua o Tuvalu* Climate Change Policy 2021-2030. In addition, there are educational policies and frameworks such as the Tuvalu Education Strategic Plan III (TESP III) 2016-2020 and the Tuvalu National Curriculum Policy Framework (TNCPF) 2019. The horizontal integration of policies and frameworks should precede their vertical alignment with Tuvalu's National Strategy for Sustainable Development – '*Te Kete*' 2021-2030, which should influence primary and secondary school ESE.

The TNBSAP 2012-2016 was formulated to manage, preserve, and address biodiversity issues and constraints. It consists of thirteen priority areas, five of which are cross-cutting issues, and the remaining eight comprise the heart of the Plan. The Department of Environment (DoE) leads the implementation of the Plan, which advocates integrating biodiversity (an ES-related concept), traditional ecological knowledge (TEK), and cultural practices into primary and secondary curricula. A current Integrated Environment Policy and Natural Resources (IEPNR) 2020-2022 was developed by DoE to address biodiversity challenges reported in the Biodiversity Rapid Assessment (BIORAP) in 2017. The policy aims to protect the environment, enhance resource management (critical components of ES) and assist Tuvalu in fulfilling its international obligations.

Furthermore, the Tuvalu National Environmental Management Strategy (NEMS) was developed by DoE and the Secretariat of the Pacific Regional Environmental Programme (SPREP) to help the government repair deteriorated environments. It emphasizes integrating TEK and cultural practices into the educational curriculum and encourages formal and informal education to promote community waste management and pollution control training. Additionally, *Te Vaka Fenua o Tuvalu* 2021-2030, Tuvalu's climate change policy, was created to address the effects of climate change (a

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concept related to ES) and the island community's vulnerability issues. The policy also addresses Tuvalu's regional and global climate change commitments and advances national objectives outlined in '*Te Kete*,' the National Strategy for Sustainable Development for 2021–2030. It replaced the earlier climate change policy, '*Te Kaniva*', which called for integrating lessons on disaster risk reduction and climate change into the curriculum.

The successful horizontal (sectoral) integration between the aforementioned environmental policies and educational frameworks, such as the Tuvalu National Curriculum Policy Framework (TNCPF) and the Tuvalu Education Strategy Plan III (TESP III) 2016-2020, is essential for the implementation of their requirements. The latter is a five-year Plan created to serve as a road map for education in Tuvalu to realise the vision of a "*Quality education for sustainable living for all*." The former charts a new course for Tuvaluan education by defining system-level guidelines, concepts, and learning and teaching principles for students from pre-primary to Year 13. It does not explicitly address environmental stewardship and related concepts such as biodiversity and disaster risk reduction. However, ES-related cross-cutting themes such as climate change and sustainability were included in the Framework. The EfS was highlighted in the philosophy section of the revised 2019 Framework. It stated that *"the education system will equip its students with skills, capacity and motivation to plan and manage change towards sustainability within their schools, families and communities"* [55] (p. 18). Under the Science Learning Area, the Framework includes curriculum material pertinent to teaching about environmental stewardship and climate change.

In addition, the Framework address the environment under the primary and secondary education sections, which state that "*the primary education curriculum emphasises life skills and pays attention to sustainable ways of living… secondary education in Tuvalu will prepare students to be more responsive to the real dangers and vulnerabilities of their environment and develop resilience in the face of this adversity"* [55] (p. 19). Additionally, the Framework states that "*children and students will understand biological, physical and chemical processes that cause natural phenomena and events through the study of sciences… they will develop an understanding and appreciation of the importance of natural resources, interrelationships in systems and sustainable ways. They will learn to live in harmony with their environment and appreciate [the] traditional use of science in their cultures"* [55] (p. 42).

Appropriately implemented, the TNCPF offers scope to align formal national ESE with the various national, regional, and international policy outcomes outlined above.

2.5. Insights on Policy Implementation

The failure of national governments to implement and localize resilience-related regional and national policies was a key finding of the Midterm Review of the Sendai Framework for Disaster Risk Reduction 2015–2030: Pacific Regional Synthesis Report [56]. This finding has important implications for ESE since capacity development (education and training across all sectors and at all levels) was cited as the most needed intervention to improve policy implementation, with formal education identified as the most effective intervention to reduce vulnerability [56].

For Pacific Small Island Developing States (PSIDS), the failure to implement policies is due to a number of factors. For example, the vast majority of policies listed above were developed without an implementation budget to ensure effective and efficient execution of the policy objectives. Since the general idea of a policy is to support government budgetary spending, this could be seen as a gaping oversight; however, PSIDS like Tuvalu, with a population of around 11,000 people, do not follow the same fiscal rules as larger nations as national governments do not have ultimate control over national finances. From 2010-2021, Tuvalu has averaged a GDP of USD 43 million annually (USD 3,900 per capita), with Overseas Development Aid (ODA) contributing between 30-55% of GDP annually [56,57]. Over this period GDP fluctuated from USD 34-59 million annually. How ODA is targeted also impacts policy implementation. For example, 86% of ODA in PSIDS is delivered through projects [58,59], which are usually implemented by regional organisations such as SPREP (Secretariat of the Pacific Regional Environment Programme) and the Pacific Community (SPC) [59], who are mandated to implement regional policies, as well as run projects which develop regional and national policies. However, this arrangement removes control of funding from national governments, so national

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priorities can be overlooked. Structuring large regional projects to run over 2 or more regional agencies also increases administration costs, reducing funds for implementation. Further constraints on funding are due to the fact that more than 40% of project spending goes towards creating "enabling environments" – mainly for the development of policies and strategies, not their implementation [59].

For Tuvalu, funding for "enabling environments" spent on much-needed national policies and plans has a limited shelf-life of around 4 to 9 years, with much still needing to be achieved related to those policies and plans before another round of spending on policy development and planning [56]. Since this has been shown to use over 40% of total ODA funding available over a 5-year period [58], it might be worth extending integrated approaches until the majority of policy and planning recommendations have been achieved rather than limiting policies to short timeframes [56].

Funding for Tuvalu is further constrained since the Organisation for Economic Co-operation and Development (OECD) Development Assistance Committee (DAC) members are not meeting expected funding targets associated with their international commitments. For DAC countries, the target for ODA to least developed countries as a share of Gross National Income (GNI) was 0.15–0.20%, whilst their contributions in 2018 and 2019 were 0.09% and 0.08%, respectively—less than half of their commitments [60].

Tuvalu is aid-dependent, and the donor-recipient relationship is not an equal one [61]. The grant-making architecture is complicated with numerous donors, differing, and at times overlapping, proposal requirements and timelines are challenging to manage given Tuvalu's limited availability of human resources (typically less than 6 staff in any government department). This indicates that the global financing environment does not account for the challenges that small countries with small public service staff face in accessing such resources [56].

Project timeframes are donor-specified and are typically 4-5 years. Current project lifecycles are far too short to meaningfully integrate ESE into formal educational provision. For example, changes to national curricula in Vanuatu to introduce disaster risk reduction into secondary education and support associated teacher training are still ongoing after 11 years [18].

3. Materials and Methods

3.1. Collection of Key Documents

We sought relevant national policy documents from government agencies addressing environmental stewardship and related themes. A combination of methods was employed, including an Internet-based search of documents on national ministries of environment, climate change, and education websites as well as a Google search using keywords such as the 'Pacific Strategy for Biodiversity Conservation, Climate change and Disaster Risk Reduction, a Global Framework for Biodiversity Conservation, Paris Agreement, Disaster Risk Reduction Global Framework and Agenda 2030 for Sustainable Development. Materials not available online were requested from relevant national agencies through email.

3.2. National Policies and Frameworks

Government policy records available online were identified in the following relevant government departments: the Education Department (EdDep), the Department of Environment (DoE), and the Department of Climate Change (DCC). DoE and DCC documents were the most recent ones used for their day-to-day management decisions (see Tables 7–10), while EdDep documents were filtered for those available from 2007 to 2019, resulting in nine documents (see Figure 4).

3.3. The National Curriculum

The National Curriculum specifies the subjects that must be taught in schools and sets out specific learning objectives for each subject at each level. We selected the syllabus for basic science, social science, geography, and biology as these are the curriculum subjects most readily aligned with environmental stewardship education [62,63]. The science [64–68] and social science [69–73] syllabi

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for years 6-10 at the Primary and Lower secondary levels were analysed for environmental stewardship-related education themes. The geography [74–76] and biology [77–79] in years 11 to 13 were analysed for similar themes. Geography and biology are optional subjects (see Tables 3–5).

3.4. Regional Policy and Frameworks

Tuvalu is part of the Pacific region, and regional policies play an important role in influencing national policies. Regional policy records available online were identified in the South Pacific Regional Environmental Programme (SPREP) and Pacific Community (SPC). The documents analysed (see Tables 9–11) included the Pacific Islands Framework for Nature Conservation and Protected Areas [54] and the Framework for Resilient Development in the Pacific [40].

3.5. International Policies and Frameworks

This study examined the consistency of national policies with international ones. Relevant global policies and frameworks that promote environmental stewardship education were identified through Internet searches (see Tables 9–12), such as the Kunming-Montreal Global Biodiversity Framework (KMGBF) and its predecessor, the Paris Agreement (PA), the Sendai Framework for Disaster Risk Reduction (SFDRR), and the 2030 Agenda for Sustainable Development (SDGs).

3.6. Document Content and Discourse Analysis of the Policy Documents

An analysis of national government policy documents on education that frame ES and its related themes was conducted to understand Tuvalu's education strategies and curriculum regarding ES. The approach used is a document content and discourse analysis based on Cardno's [80] and Perryman's [81] typologies. *Document content analysis* aims to extract meaning from data by revealing underlying themes, patterns, and trends that reveal authors' intentions, worldviews and practises [80]. *Document discourse analysis* focuses on the social and cultural contexts in which the documents were produced and how the language used reflects and shapes those contexts [81].

We conducted a document content and discourse analysis of government, regional, and international documentation. We read the documents to examine the language used and whether ES is emphasised in government documents. The intent of the government documents and the expression of environmental stewardship in school curricula were analysed for relationship linkages. We were particularly interested in how the educational policies and national curriculum mirrored the language of environmental policies that call for the inclusion of environmental stewardship and related themes. The inquiry was broadened to see if national policies were consistent with regional and international ones.

This research utilised keywords and phrases employed by Thorne [20] (p. 100) and Aikens et al. [82] (p. 338) to identify the actual word 'environmental stewardship', 'phrases related to environmental stewardship', and 'phrases that depict an inference to environmental stewardship' in policy documents. These search terms and phrases were compared to the environmental and education documents, and repeated words were highlighted and tallied. To determine the rhetoric and meaning of words and phrases in policy documents, tone and mood were analysed. The analysis of the content and discourse of policy documents was carried out. A summary of all documents collected for analysis is presented in Figure 4.

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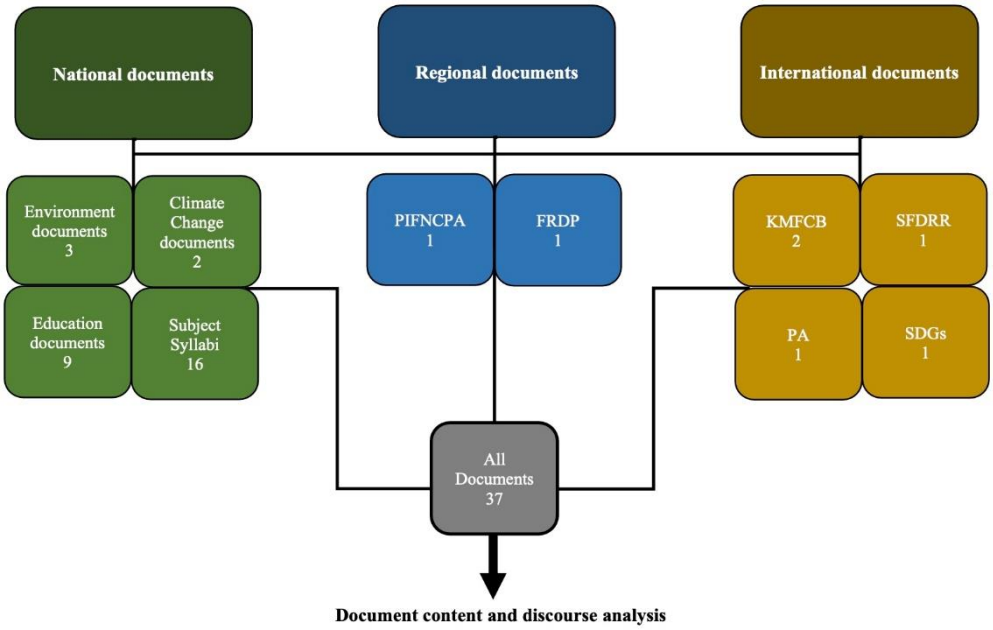

Figure 4. A summary of all documents collected and analysed. Source: Own composition.

4. Results

4.1. Environmental Stewardship Promotion in Government Education Documents

The analysis of 30 national documents, especially the 9 educational policy documents from 2007 to 2019, revealed that environmental stewardship was not explicitly emphasised in government documents between 2007 and 2019 (see Table 1). However, environmental stewardship-related themes identified as sustainability, environment, biodiversity, climate change, and disaster risk reduction were referenced in educational documents, with sustainability and the environment being the most referenced concepts. A notable observation derived from Table 1 relates to the difference in references to sustainability and climate change. Using Wilcoxon's signed-ranked test, the results indicated a significant difference between the number of references to sustainability (*Mdn* = 21.00, n = 9) and climate change (*Mdn* = 2.00, n = 9), z = -2.521, p = .012, with large effect size, r = .84. This suggests that the government has been favouring sustainability in its policies, but it has been giving less attention to climate change. However, a significant global shift in climate policy occurred in 2015 with the universal endorsement of the Paris Accord, a political landmark agreement that was also endorsed by Tuvalu. This international development seems to have prompted the government to increase its focus on climate change in its education policies from 2016 onwards.

Table 1. References of ES-related concepts in government education documents.

Year	Document - Author	ES	Sus	Env	BD	CC	DRR
2007	Early Childhood Care and Education Policy 2007 – Government of Tuvalu	0	0	8	0	0	0
2009	National Education Polciy – Government of Tuvalu	0	1	1	0	0	0
2011	Tuvalu Education Sector Plan II (TESP II) 2011 -2015 – Government of Tuvalu	0	2	5	0	0	0
2013	Tuvalu National Curriculum Policy Framework (TNCPF 2013): Quality Education for sustainable living for all – Government of Tuvalu	0	31	28	0	0	0

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2013	Tuvalu MDG Acceleration Framework: Improving Quality Education – Government of Tuvalu	0	43	8	0	2	0
2015	Education for All 2015 National Review Report: Tuvalu – Government of Tuvalu	0	21	20	0	3	0
2016	Tuvalu Education Sector Plan III (TESP III) 2016-2020 – Government of Tuvalu	0	25	7	0	17	8
2017	Tuvalu Education Sector Situational Analysis – Government of Tuvalu	0	9	5	0	2	3
2019	Tuvalu National Curriculum Policy Framework (TNCPF 2019): Quality Education for sustainable living for all – Government of Tuvalu	0	29	26	0	5	0

Source: Tinilau (2024) PhD Thesis. **ES** – Environmental Stewardship; **Sus** – Sustainability; **Env** – Environment; **BD** – Biodiversity; **CC** – Climate Change; **DRR** – Disaster Risk Reduction.

The Tuvalu Education Sector Plan III (TESP III) 2016-2020 [83] and the revised Tuvalu National Curriculum Policy Framework (TNCPF 2019) [55] are two important education documents in Tuvalu. The Plan prioritises climate change and disaster risk reduction, while the Framework prioritises environment and sustainability. The Plan's main goal was to "nurture young Tuvaluans who are productive, self-reliant, responsible and with deep affection and sense of service for Tuvalu and the people of Tuvalu" [83] (p. 17). On the other hand, the Framework recognises education for sustainability, stating that "the education system will equip its students with skills, capacity and motivation to plan and manage change towards sustainability within their schools, families and communities" [55] (p. 18). However, these documents did not promote biodiversity and environmental stewardship, and the lack of educational measures that foster an environmentally aware society appears negligent.

4.2. Environmental Stewardship Education in Primary and Secondary Schools Curricula

Environmental stewardship (ES) and environmental stewardship-related concepts such as sustainability, environment, climate change (CC), biodiversity and disaster risk reduction (DRR) are delivered through national curricula in ten elementary and two secondary schools with English as the medium of instruction [84]. As a result of the review of the TESP II 2011-2015 to formulate the TESP III 2016-2020, a key recommendation was to improve the curriculum and assessment. This recommendation coincided with the formulation of the first-ever Tuvalu National Curriculum and Policy Framework (TNCPF) in 2013, which proposes the adoption of an outcome-based curriculum [85] (p. 14). Further work must be done to transform the TNCPF into syllabi, teaching guides, and student handbooks aligned with an outcomes-based curriculum from preschool to year 13 [86] (p. 33).

4.2.1. Primary and Lower Secondary Education (Years 1-10)

The sixteen subject syllabi that were analysed revealed that aspects of environmental stewardship were primarily addressed in social science and basic science in the current primary school curriculum (Years 1 to 8) and lower secondary curriculum (Years 9 and 10) and are already taught in schools in 2022 [64–73]. Environmental stewardship was not explicitly mentioned in the social and basic science curricula (Years 6 to 10). However, aspects of environmental stewardship are included as major, key, and specific learning outcomes [64–73]. Figure 5 compares the two disciplines' total teaching hours spent on environmental stewardship aspects in primary and lower secondary schools. The total teaching hours for both subjects in primary school in the three years (Years 6-8) is 306. For lower secondary school, the total teaching hours for both subjects in the two years (Years 9 & 10) is 216.

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At the Primary level, 14% of environmental stewardship-related concepts are covered in social science (11% environmental education and 3% sustainability). In basic science, only environmental education is covered. In contrast, the Lower secondary level is mostly dominated by environmental education (4% covered in social science and 27% in basic science). The rest are other elements of social and basic science. Figure 5 shows that environmental stewardship, biodiversity, climate change, and disaster risk reduction are not included in the social and basic science curricula from Years 6 to 10. This contradicts the Education Department's strategic plan and curriculum policy framework, which explicitly states climate change as one of the guiding agendas.

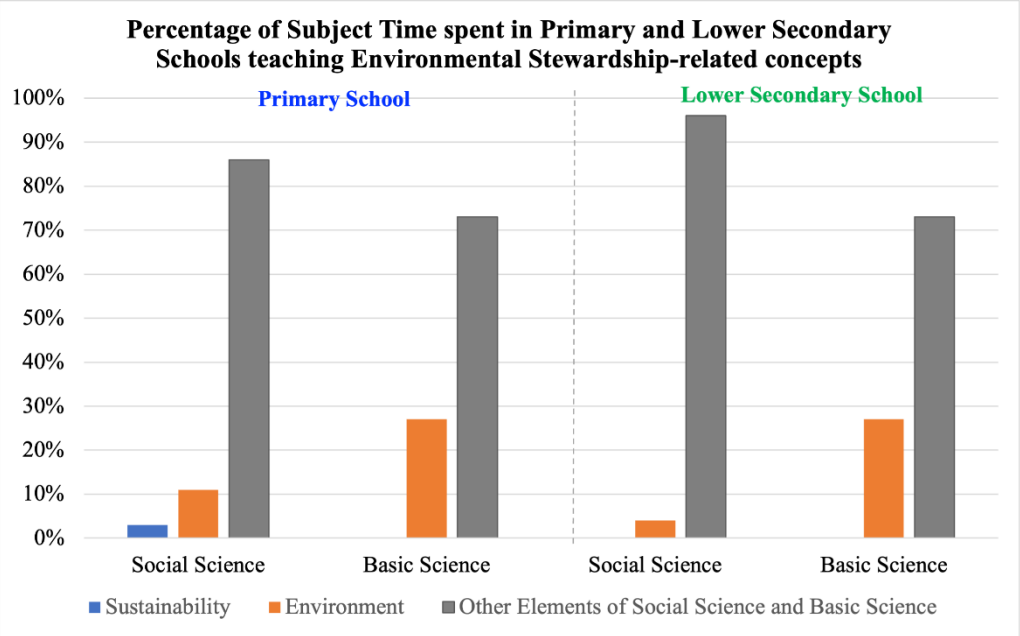

Figure 5. Percentage of Subject Time spent on Environmental Stewardship-related ideas. Source: Tinilau (2024) PhD Thesis.

In social science, environmental stewardship-related concepts are included in the following topics: Place, Space and Environment, Time, Continuity and Change, and Resources and Economic Activities. The total number of hours covered is 44 (14%) of social science's 306 hours covered over the three years. Table 2 below shows how environmental stewardship-related concepts are taught in Year 7, over four weeks in Term 2, with 3 hours per week [55]. The maximum number of instructional hours per week for primary pupils in Tuvalu is 25, and the school year consists of 12 weeks for Term 1 and 13 weeks for Terms 2 and 3, respectively. Two weeks of the 38 weeks in Term 3 are occupied by Exams [87].

The overall instruction time for all subjects, excluding exam weeks, is 2,700 hours spread over three years (Years 6–8). Less than 2% of this time is spent on environmental stewardship-related education.

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Table 2. Aspect of Environmental Stewardship Taught in Social and Basic Science, Year 7.

Subject	Topic	Sub-topic	Major Learning Outcomes
Social Science	Place, Space and Environment	Environment Environmental issues	Students are able to demonstrate understanding of place, space and environment.
	Resources and Economic Activities	Resources Resources Management	Students are able to demonstrate understanding of resources and economic activities of a country.
Basic science	Ecosystems	Ecosystem, Environment, Environmental Resources Ecosystem Environment and Ecosystem Resource Field Trip Impact of Introduced Plants and Animals Conservation	Demonstrating an understanding of the ecosystem operating in a dynamic balance; the management of resources available in the ecosystem.
	Environment and Waste Management	Biodegradable and Non-Biodegradable Environmental Effects of Household Rubbish Caring for the Environment	Demonstrate an understanding of biodegradable and non-biodegradable substances and the need to reduce waste.

Source: Tinilau (2024) PhD Thesis.

4.2.2. Upper Secondary Education (Years 11-13)

In the upper secondary, environmental stewardship issues are featured in curricula for geography and biology strands [76,79]. Figure 6 compares the total teaching hours spent on environmental stewardship and related themes of the two disciplines. Tables 3 and 4 indicate the prominence of environmental stewardship concerns within their entire syllabi. Geography offers the most thorough examination of environmental stewardship-related topics, strongly emphasising environmental issues and less attention paid to climate change and biodiversity. Biology has the fewest teaching hours on environmental stewardship, with the majority occurring in Years 12 and 13.

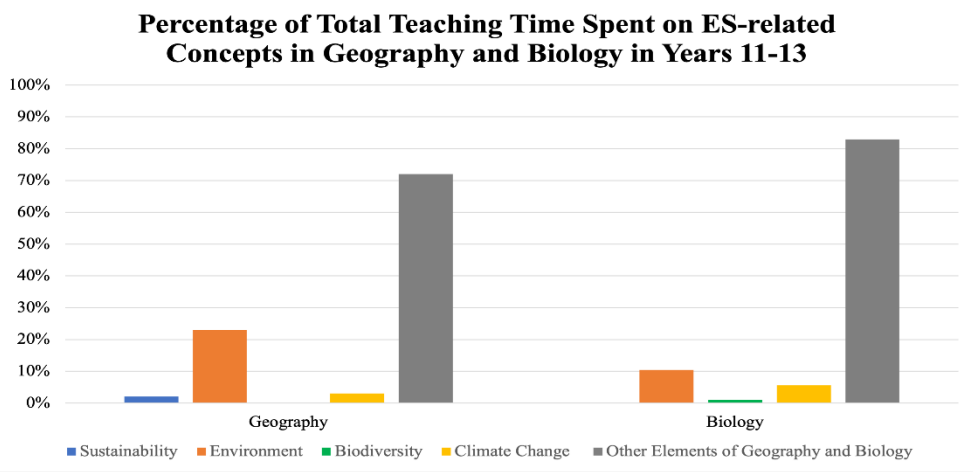

Figure 6. Percentage of total teaching time spent on environmental stewardship, Years 11-13. Source: Tinilau (2024) PhD Thesis.

Environmental issues such as climate change and conservation dominate the teaching time, with biodiversity only covered in Year 13 and is only mentioned once. The inclusion of climate change and biodiversity in the upper secondary curricula was due to the Year 13 geography and biology curricula set by SPC's Educational Quality and Assessment Programme (EQAP). Environmental stewardship and disaster risk reduction were not expressly promoted in upper secondary schooling.

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Table 3. Environmental stewardship and related concepts in Years 11 to 13 geography syllabus.

Strand Title	Year	Topic/Sub-strand Relating to Sustainability, Environment, Biodiversity, CC and DRR	Aspects of Environmental Stewardship Education	Estimated Teaching Hours on the Sustainability* Environment, Biodiversity✪, CC and *DRR* per Year	Total Teaching Hours for the Strand per Year	% Of Teaching Time (All Strands Years 11-13) on Stewardship
Natural Processes	11	Living with natural hazards – tropical cyclones, volcanoes, earthquakes	Impact of disasters on the environment	13	29	3
		Use and management of natural resources – natural resources terms, water distribution	Sustainable management of resources	7*	21	2
		The natural landscape – geomorphology, weathering, fluvial, aeolian erosion	Different geographic environments	4	16	1
	12	The natural landscape		36	36	9
	13	Internal Assessment	Nature and causes of climate change	13	40	3
Cultural Processes	11	Consequences of population growth	Migration and human impacts on the environment	3	25	1
	12	The challenges of urbanisation and urban environment		3	51	1
		Effects of tourism on people, economy and environment	Eco-tourism and the impacts of tourism on the environment	2	37	1
	13	Cultural processes in different environments	Impact of cultural process on the environment	3	32	1
Geographical Skills	11	Practical skills – drawing & graphic	Reporting and Research skills	5	17	1
	12	Skills and field research	Mapping and research skills	18	20	4
	13	Practical skills, key concepts and ideas	Planning, evaluating and strategizing skills	4	40	1
Practical Research	13	Internal Assessment	-	-	32	?
All strands	11		13 + 7* + 4 + 3 + 5 = 32		108	30%
	12		36 + 3 + 2 + 18 = 59 → 111		144 → 396	41% → 28%
	13		13 + 3 + 4 = 20		144	14%

Source: Own composition based on analysing geography syllabi [74–76].

Table 4. Environmental stewardship and related concepts in Years 11 to 13 biology syllabus**.**

Strand Title	Year	Topic/Sub-strand Relating to Sustainability, Environment, Biodiversity, CC and DRR	Aspects of Environmental Stewardship Education	Estimated Teaching Hours on the Sustainability* Environment, Biodiversity✪, CC and *DRR* per Year	Total Teaching Hours for the Strand per Year	% Of Teaching Time (All Strands Years 11-13) on Stewardship
Organisms Level Biology	12	Excretion in animals	Excretory system of animals	1	36	0.3
		Ecological niche	Animal species habitat and/or niche	3	14.5	0.8
	13	Timing responses	Environmental destruction on some organism's biological clocks and survival	2	14.5	0.5
		Intraspecific interaction	Mating and courtship influence survival of species	3	14.5	0.8
		Internal Assessment	Investigation on an Ecological Niche	14.5	14.5	3.7
Environmental Biology	11	Populations, communities and ecosystems	Decomposer's importance to the environment	1	29	0.3
		Environmental impact study	Human impact on the environment	5	29	1
	12	Ecosystem	Biodiversity and ecosystem services	2✪	12	0.5
		Internal Assessment	Environmental investigation	14	14	3.5
		Climate change	Consequences of climate change on biodiversity	4✪	7	1
	13	Conservation	Conservation practices (afforestation, reforestation, use of renewable energy)	3	7	0.8
		Internal Assessment	Poster on climate change	15	15	3.8
All strands	11		1 + 5 = 6		108	6%
	12		1 + 2✪ + 14 = 17 → 68		144 → 396	12% → 17%
	13		3 + 2 + 3 + 14.5 + 4✪ + 3 + 15 = 45		144	31%

Source: Own composition based on analysing biology syllabi [77–79].

Therefore, students who complete Years 11, 12 and 13 are exposed to 396 geography and biology teaching hours. For geography, 73 hours (18%) cover nature and the impacts of disasters on the environment, 11 hours (3%) are on the impact of culture and humans on the environment, and 7% on geographical skills. For biology, 23 hours (6%) cover organisms' interaction with the environment and 43 hours (11%) on environmental biology.

The most important details in this text are that due to the optional nature of both subjects, students have limited exposure to environmental stewardship and only a few benefits from environmental stewardship-related concepts. Additionally, there are few opportunities for students in biology and geography courses to actively contribute to environmental preservation. Also, there is minimal use of pedagogical approaches that promote environmental stewardship education, such as participatory action research [88] (p. 551), place-based learning [15] (p. 170), project-based learning [23] (p. 180), action competence learning [89] (p. 497), and community service learning [90] (p. 216).

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Furthermore, many of the elements highlighted in Tuvalu's three central environmental policies – Tuvalu National Biodiversity Strategy and Action Plan 2012-2016, *Te Vaka Fenua o Tuvalu*: National Climate Change Policy 2021-2030, and *Te Kete*: Tuvalu National Strategy for Sustainable Development 2021-2030 – were not included in the school curriculum.

Consequently, the specific learning outcomes for the geography and biology syllabi for Year 13 (Table 5) and (Table 6) are not aligned with Tuvalu's three key policies (Table 7). There is a significant mismatch between biodiversity conservation and protection, seabed mining issues, sustainable resource management, environmental and social impact assessment, and disaster risk priorities. However environmental stewardship-related topics are included in these subjects, but it is unclear if they are sufficient to promote environmental stewardship behavioural changes that produce good environmental stewards "who recognise themselves to be *of* the world and who also assume responsibility *for* the world" [91] (p. 36).

Table 5. Specific learning outcomes in geography on issues relating to environmental stewardship.

1.2Geo1.2 Geographical Presentation (IA)
Define climate change.
Identify the natural causes of climate change.
Identify the human causes of climate change.
Describe the effects of climate change on a natural process.
Explain how climate change has affected spatial and or temporal variation of the natural processes using specific case study.
Describe the adaptation/mitigation measures to address climate change.
Explain the causes of climate change.
Explain comprehensively the impact of climate change on the natural process using specific case study evidence.
Evaluate the effectiveness of the strategies to overcome the negative impacts of climate change on the people and/or the environment.
2.1Geo2.1 Cultural process in different environments
Identify/name a cultural process that operates in a chosen geographic environment.
Identify/name the elements of the cultural processes that operate in a chosen geographic environment.
Develop a map key for a sketch map to show the cultural processes that operate in a chosen geographic environment.
Develop a map key for a sketch map of how cultural processes vary within different parts of a chosen environment.
Draw a sketch map to show the cultural processes that operate in a chosen geographic environment.
Draw a sketch map to show the cultural processes that operate within a different part of a chosen environment.
List the elements of the cultural processes within a chosen geographic environment.
Describe the local spatial and/or temporal variations in this cultural process within a chosen geographic environment.
Explain how the cultural processes operate within a chosen geographic environment.
Describe in detail the elements of the cultural processes within a chosen geographic environment.
Describe how the cultural process has affected the distribution of phenomena within a chosen geographic environment.
Evaluate the impact of the cultural process on people and/or the environment.

Source: EQAP [76].

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Table 6. Specific learning outcomes in biology on issues relating to environmental stewardship.

Source: EQAP [79]

1.1Bio1.1 Ecological niche
Describe the environment in terms of abiotic and biotic factors for a niche.
1.3Bio1.3 Timing responses
Discuss the implications of environmental destruction on biological clocks and survival of named organisms.
1.5Bio1.5 Intraspecific interactions
Discuss the evolution of group living and evaluate whether group living continues to be an advantage under changing social and environmental conditions.
5.1Bio5.1 Climate change
Define climate change.
Identify climate change in a given context.
List the features of climate change (melting of polar ice caps, rising sea levels, heavy rains, death of coral reefs, migration of fishes and insects, stronger cyclones, drought, flooding, extreme temperatures).
Describe the effects of climate change in terms of rising sea levels.
Describe the effects of climate change on weather patterns (stronger cyclones/flooding/drought).
Describe the effects of climate change on coral reefs (coral bleaching/migration of fish).
Explain how human activity (fossil fuels/deforestation) contributes to climate change.
Discuss the consequences of climate change on the livelihoods (water/food/medicine/shelter/clothing) of people living in the Pacific Island countries due to more extreme weather conditions (drought/flooding/stronger cyclones/extreme temperatures) using local examples.
Discuss the consequences of climate change on biodiversity (species composition) using coral reef ecosystem (coral bleaching/death of corals) as an example.
Demonstrate originality and creativity in constructing a poster/model on climate change issues.
5.2Bio5.2 Conservation
Define adaptation in the context of global warming/climate change.
Define mitigation in the context of global warming/climate change.
List ways (building seawalls/relocation/planting on higher grounds/proper drainage/building wells) of adapting to climate change/global warming.
Explain ways (building seawalls/relocation/planting on higher grounds/proper drainage/building wells) of adapting to climate change/global warming.
Discuss how a renewable source of energy can be used to address the issue of climate change.

Source: EQAP [79].

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Table 7. Goals of Tuvalu's relevant policies on environmental stewardship.

Tuvalu National Biodiversity Strategy and Action Plan (NBSAP) 2012-2016	***Te Vaka Fenua o Tuvalu*: National Climate Change Policy 2021-2030**	***Te Kete*: Tuvalu National Strategy for Sustainable Development 2021-2030**
Broad goals of the NBSAP shall be: ▪ To prevent air, land and marine pollution. ▪ To control and eliminate invasive species. ▪ To rehabilitate and restore degraded ecosystems. ▪ To promote and strengthen the conservation and sustainable use of Tuvalu's biological diversity (BD). ▪ To recognise, protect and apply traditional knowledge, innovations and best practices in relation to the management, protection and utilisation of biological resources. ▪ To protect wildlife. ▪ To protect the seabed and control overharvesting in high seas and territorial waters.	**Overall Goal:** To protect Tuvalu from the impacts of climate change through bold and decisive actions that strengthen the resilience of our people and natural ecosystems to climate risks by 2030.	**Strategic Priority Area 1: Enabling Environment – Goal:** The required institutional, policy and regulatory enablers are imperative platforms which facilitate the effective achievements of our national vision and are rated priority in the overall execution of *Te Kete.*
Strategic Goals (SG) **SG1:** Build resilience of biodiversity to manage, control and reduce the risks and impacts of climate change and natural disasters. **SG2:** Increase the use of traditional knowledge and practice in the conservation and management of biodiversity in Tuvalu as well as the equitable sharing of benefits. **SG3:** Protect and conserve biological diversity of ecosystems, species, and genetic resources. **SG4:** Enhance capacities of all islands (Falekaupule and NGOs) to empower them take the lead in the implementation of biodiversity strategy and action plan. **SG5:** Improve the sustainable management and use of existing conservation areas and establish more conversation areas throughout the nation.	**Policy Objectives (PO)** **PO1.1:** To enhance government, private sector and civil society access to climate finance. **PO1.2:** To lead and galvanise global and regional partnerships on climate action. **PO2.1:** To fully coordinate and integrate climate and disaster risks and adaptation actions into legislation, policies and decision-making processes at all levels. **PO2.2:** To enhance household food security and climate-resilient agricultural practices. **PO2.3:** To protect marine biodiversity and to	**Key Strategic Actions (KSA) Climate Change and Disaster Resilience Increased** **KSA 1.4.1** Develop long-term national adaptation strategy, including a staged land reclamation programme, that takes into account a worse-case scenario of sea level in Tuvalu rising by one meter by year 2100. **KSA 1.4. 2** Secure increased funding from global climate financing facilities. **KSA 1.4.3** Strengthen access to labour mobility schemes. **KSA 1.4.4** Develop effective frameworks for disaster risk and resilience management. **KSA 1.4.5** Implement a land rehabilitation and reclamation framework that

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SG6: Revive the production and consumption of local food. **SG7:** Integrating key biodiversity conservation criteria into existing and new management policies, strategies and plans. **SG8:** Manage and eradicate invasive species and enforce biosecurity to protect and conserve biodiversity of Tuvalu.	sustainably manage ocean resources. **PO2.4:** To strengthen local community participation in water and sanitation management. **PO2.5:** To strengthen and improve existing health sector planning and response to climate-induced health risks. **PO2.6:** To promote and protect coastal environments from rising sea levels and the impacts of climate change. **PO2.7:** To embed climate and disaster risks into land use management and infrastructure planning. **PO2.8:** To strive for energy security from a sustainable mix of renewable energy sources. **PO3.1:** To protect the rights of Tuvaluan people and ensure their safe movement. **PO3.2:** To safeguard Tuvalu's identity, cultural heritage and territorial sovereignty.	is resilient to sea level rise and climate change impacts. **Environment, Meteorology, Land and Waste Management Strengthened** **KSA 1.5.1** Enforce application and management of Environmental and Social Impact Assessments. **KSA 1.5. 2** Improve Meteorology services capacity to respond to climate change, disaster resilience and adaptive capacity. **KSA 1.5.3** Develop the capacity to implement Multi-Hazard Early Warning Systems (MHEWS). **KSA 1.5.4** Develop and improved waste management strategies with local communities and the private sector. **KSA 1.5.5** Adopt and implement a Geospatial Information Framework to measure, monitor, quantify and manage Tuvalu's natural environment.

Source: Own composition.

4.3. Student Attrition and Environmental Stewardship Education

Education in Tuvalu at the Primary school level is free and compulsory; by law, everyone between the ages of six and fifteen must attend school. With assistance from development partners, the government pays for tuition, books and stationery, infrastructure development, and teacher recruitment. However, Table 8 reveals high attrition rates, possibly due to national exams after Years 8, 10, 11, and 12 and parents sending their children to Fiji for secondary education. In 2022, there were only 148 students in Year 11 and 66 in Year 13, compared to 244 in Year 1 [92], representing 39% and 73% attrition rates, respectively. Statistics from 2010 show that there were 235 current Year 13 students in Year 1 [93] (p. 19), representing a 72% attrition rate.

Motufoua Secondary School, the only government-owned institution in Tuvalu, has 148 students enrolled in Year 11, but only 20 (14%) study geography and 11 (7%) study biology. Fifteen-15 (15%) of the 98 students in Year 12 chose geography, while 21 (21%) chose biology. About half of the 66 students enrolling in Year 13 elected to study both optional subjects: 14 (21%) studied geography, and 18 (27%) studied biology. Most young people in Tuvalu do not benefit from formal exposure to environmental stewardship education (ESE) because most learning about these topics and associated ideas only occurs in the senior cycle, notably Year 13, and is limited to two optional subjects. Integrating ESE into secondary education may be counter-productive due to the high dropout rate. Primary school is the most impactful level at which climate change education (CCE) and ESE could be embedded [30,94–96].

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Table 8. Attrition rates in primary and secondary schools.

	Primary School								Secondary School					
ECCE	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Year 11**	**Year 12**	**Year 13**	**Total**
718	244	222	248	232	219	225	221	243	203	173	148	98	66	3260
% change between successive years		-9.0	+11.7	-6.50	-5.60	+2.7	-1.80	+10.0	-16.5	-14.8	-14.5	-33.8	-32.7	-

ECCE – Early Childhood Care Education. Source: Own composition.

4.4. Environmental Stewardship-Related Government Policies and Frameworks

Tuvalu's policies and frameworks related to environmental stewardship, such as the Tuvalu National Biodiversity Strategy and Action Plan (TNBSAP) 2012-2016, Integrated Environment and Natural Resources Policy (IENRP) 2020-2022, Tuvalu Environmental Management Strategy (NEMS) 2022-2026, and Tuvalu Climate Change Policy, *Te Vaka Fenua o Tuvalu* 2021-2030 have been developed within the framework of international policies such as the Strategic Plan for Biodiversity 2011-2020, Sendai Framework for Disaster Risk Reduction (SDFRR) 2015-2030, the Paris Agreement of 2015 and the United Nations Sustainable Development Goals 2015-2030, and of regional policies such as the Pacific Islands Framework for Nature Conservation and Protected Areas (PIFNCPA) 2021-2025 [54] (p. 8) and the Framework for Resilient Development in the Pacific (FRDP) 2017-2030 [40] (p. 3). The broad goals of the relevant policies are summarised in Table 9. The vision of the 'TNBSAP' is that "Tuvalu would have a clean and healthy environment, full of biological resources where present and future generations of Tuvalu will continue to enjoy the equitable sharing of benefits of Tuvalu's abundant biological diversity" [97] (p. 21).

Te Vaka Fenua o Tuvalu's vision states, "A strong and resilient Tuvalu that protects the identity, culture and existence of our people and meets our commitment to environmental sustainability" [98] (p. 3). Implementing these policies entails incorporating biodiversity, climate and disaster risks and adaptations into sector strategies [97,98] (p. 42; p. 8), including the Tuvalu Education Sector Plan (TESP) III 2016-2020 and the revised 2019 Tuvalu National Curriculum Policy Framework (TNCPF). However, a mismatch exists between government policies and frameworks since critical issues within government policies and frameworks relating to stewardship call for incorporating biodiversity conservation, climate and disaster risks, and adaptations into policy, strategies, and plans at all levels of government (see **SG7**, **PO2.1** and **KSA1.4.4** in Table 7). Table 9 overleaf shows regional and international policies and frameworks echoing the call.

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Table 9. Broad goals of national, regional & international policies on environmental stewardship.

Policy	Overall Goals	Reference
	Tuvalu's National Policies	
Tuvalu National Biodiversity Strategy and Action Plan (NBSAP) 2012-2016	Broad goals for the NBSAP shall be: ▪ To prevent air, land and marine pollution. ▪ To control and eliminate invasive species. ▪ To rehabilitate and restore degraded ecosystems. ▪ To promote and strengthen the conservation and sustainable use of Tuvalu's biological diversity (BD). ▪ To recognise, protect and apply traditional knowledge, innovations and best practices in relation to the management, protection and utilisation of biological resources. ▪ To protect wildlife. ▪ To protect the seabed and control overharvesting in high seas and territorial waters.	[97] (p. 22)
Integrated Environment and Natural Resources Policy 2020-2022	The goals are under the three sustainability pillars – community, economy, and environment. Goal 1 Community: Vibrant, healthy ecosystems secure/safeguard the well-being of communities. Goal 2 Economy: Sustainable resource use safeguards a resilient and prosperous Tuvalu. Goal 3 Environment: Value local, traditional ecological knowledge and best practices that promote management and sustainable use of Tuvalu's natural resources.	[108] (p. 8)
Tuvalu National Environmental Management Strategy (NEMS) 2022-2026	To strengthen the national, regional and international coordination of the government's efforts to cope with the nation's complex environmental issues.	[109] (p. 14)
Te Vaka Fenua o Tuvalu: National Climate Change Policy 2021-2030	To protect Tuvalu from the impacts of climate change through bold and decisive actions that strengthen the resilience of our people and natural ecosystems to climate risks by 2030.	[98] (p. 3)
Te Kete: Tuvalu National Strategy for Sustainable Development 2021-2030	Tuvalu's goals to achieve 'A Peaceful Resilient and Prosperous Tuvalu' are stated under five pillars – enabling environment, economic development, social development, island and culture development, and infrastructure development. **Goal Strategic Area 1: Enabling Environment:** The required institutional, policy and regulatory enablers are imperative platforms which facilitate the effective achievements of our national vision and are rated priority in the overall execution of *Te Kete*.	[1] (p. 3)
	Regional Policies – Pacific Region	
Pacific Islands Framework for Nature Conservation and Protected Areas 2021-2025	The goals are given under the three pillars of sustainability – society, economy and environment. Goal 1 Society: Pacific Peoples are leading activities for the conservation and sustainable use of natural resources and the preservation of cultural heritage for the benefit of present and future generations. Goal 2 Economy: Nature conservation and sustainable resource use are the foundation of all island economies. Goal 3 Environment: The biodiversity and natural environment of the Pacific are conserved in perpetuity.	[54] (p. 8)
Framework for Resilient Development in the Pacific (FRDP) 2017-2030	Goal 1: Strengthened integrated adaptation and risk reduction to enhance resilience to climate change and disasters Goal 2: Low Carbon development Goal 3: Strengthened disaster preparedness, response and recovery	[40] (p. 3)
	International Policies	
Strategic Plan for Biodiversity 2011-2020	Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society Goal B: Reduce the direct pressure on biodiversity and promote sustainable use Goal C: Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity Goal D: Enhance the benefits to all from biodiversity and ecosystem services Goal E: Enhance implementation through participatory planning, knowledge management and capacity building	[110] (p. 2)
Kunming-Montreal Global Goals for 2050	Goal A: The integrity, connectivity and resilience of all ecosystems are maintained, enhanced, or restored, substantially increasing the area of natural ecosystems by 2050; Human-induced extinction of known threatened species is halted, and, by 2050, extinction rate and risk of all species are reduced tenfold and the abundance of native wild species is increased to healthy and resilient levels; The genetic diversity within populations of wild and domesticated species, is maintained, safeguarding their adaptive potential Goal B: Biodiversity is sustainably used and managed and nature's contributions to people, including ecosystem functions and services, are valued, maintained and enhanced, with those currently in decline being restored, supporting the achievement of sustainable development for the benefit of present and future generations by 2050. Goal C: The monetary and non-monetary benefits from the utilization of genetic resources, and digital sequence information on genetic resources, and of traditional knowledge associated with genetic resources, as applicable, are shared fairly and equitably, including, as appropriate with indigenous peoples and local communities, and substantially increased by 2050, while ensuring traditional knowledge associated with genetic resources is appropriately protected, thereby contributing to the conservation and sustainable use of biodiversity, in accordance with internationally agreed access and benefit-sharing instruments. Goal D: Adequate means of implementation, including financial resources, capacity-building, technical and scientific cooperation, and access to and transfer of technology to fully implement the Kunming-Montreal global biodiversity framework are secured and equitably accessible to all Parties, especially developing countries, in particular the least developed countries and small island developing States, as well as countries with economies in transition, progressively closing the biodiversity finance gap of 700 billion dollars per year, and aligning financial flows with the Kunming-Montreal Global Biodiversity Framework and the 2050 Vision for Biodiversity.	[41] (p. 8) CBD/COP/15/L.25

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Paris Agreement (COP 21)	Its goal is to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels. Article 82 calls upon all parties to ensure that education, training and public awareness, as reflected in Article 6 of the Convention and in Article 12 of the Agreement, are adequately considered in their contribution to capacity- building. The Paris Committee on Capacity-building (PCCB) aims to address current and emerging gaps and needs in implementing and further enhancing capacity- building in developing countries.	[111] (p. 12)
Sendai Framework for DRR 2015-2030	Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience.	[42] (p.12)
Sustainable Development Goals SDG 13 (Climate Action), SDG 14 (Life Below Water), and SDG 15 (Life on Land)	SDG 13 aims to 'take urgent action to combat climate change and its impacts.' It includes 13.3: Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning. SDG 14 aims to 'conserve and sustainably use the oceans, seas and marine resources for sustainable development.' It includes 14.a: Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries. SDG 15 aims to 'protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and biodiversity loss.' It includes 15.9: By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts.	[112] (pp. 25-27)

Source: [1,40–42,54,97,98,108–112].

When determining whether existing environmental stewardship-related government policies prioritise capacity building in schools, TNBSAP, IENRP, and NEMS all advocate for stewardship capacity building through formal school instruction (see Table 10); however, *Te Vaka Fenua o Tuvalu* and *Te Kete* do not emphasise developing stewardship skills through formal elementary and secondary school (see Table 7). When national policies are compared to regional and international policies, there is an apparent misalignment due to a lack of specific guidance on stewardship education in national policies. Regional frameworks such as the PIFNCPA and FRDP (see Table 11) make explicit references to capacity-building through formal education, as do international frameworks such as the Strategic Plan for Biodiversity 2011-2020, the Kunming-Montreal Global Biodiversity Framework (KMGBF) 2022-2030, and the Sendai Framework for Disaster Risk Reduction 2021-2030 (see Table 12). This underscores the importance of achieving vertical alignment between national, regional, and international policies to foster cohesive and coordinated efforts towards environmental stewardship education.

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Table 10. Capacity-building references in school-related environmental policies.

Policy/Framework	Aspect of Capacity-building	Reference
Tuvalu National Biodiversity Strategy and Action Plan (TNBSAP) 2012-2016	Formulate training modules as well as relevant curricula streams – the latter for incorporation of the teaching of biodiversity at all levels of schooling in the country, while the former is for national and community training workshops	**Cross-Cutting Issue 1**: Capacity Building, Education, Training, Awareness and Understanding, p. 24.
	Streamline biodiversity into primary and secondary curricula.	**Cross-Cutting Issue 1**: Capacity Building, Education, Training, Awareness and Understanding, Objectives 3, Actions 2, p. 27. [97] (pp. 24, 27)
Integrated Environment and Natural Resources Policy (IENRP) 2020-2022	Increase citizenry conservation through responsible waste management behaviour and participate in activities while complying with the applicable laws through awareness and education.	**Objective 3**, Strategies bullet point 1, p. 11.
	Include waste management and pollution control subjects in the school curriculum, public awareness and in radio programs.	**Objective 3**, Strategies bullet point 4, p. 11. [108] (p. 11)
Tuvalu National Environmental Management Strategy (NEMS) 2022-2026	Communities trained through formal and informal education on waste management and pollution control	Section 3.8 Theme 8, NEMS Actions 8.1.1, p. 34 [109] (p. 34)

Source: [97,108,109].

Table 11. Capacity-building references in regional environmental frameworks for schools.

Pacific Islands Framework for Nature Conservation and Protected Areas (PIFNCPA) 2021-2025			
Strategic Objectives	**Priority Actions**	**Best Practice**	**Page No.**
1. Empower our people to take action for nature conservation, based on our understanding of nature's importance for our cultures, economies, and communities	Behaviour change for nature conservation through identity, traditional knowledge, education, heritage, and cultural expressions.	Education-for-conservation and art-for-conservation initiatives must value and celebrate Pacific cultural expressions by cultivating partnerships with our elders, educators, artists, athletes and community role models, as well as with our youth, women's, faith-based and cultural organisations. Existing traditional schools of learning should be supported by conservation partners, as well as newer forms of education.	18
Framework for Resilient Development in the Pacific (FRDP) 2017-2030			
Goal	**Stakeholder**	**Priority Actions**	**Page No.**
1. Strengthened Integrated Adaptation and Risk Reduction to Enhance Resilience to Climate Change and Disasters	National and Subnational Governments and Administrations	q) Strengthen knowledge on the causes, local impacts and responses to climate change, hazards and disasters, and *build capacity for local adaptation and other risk management measures through formal and non-formal education systems*, including for loss and damage.	15
		r) Improve understanding and applications of successful strategies to increase resilience by documenting traditional, contemporary and scientific knowledge and lessons learned to develop and utilise appropriate awareness, communication, *education and information materials for communities, media, schools, training providers and universities*.	16
	Regional Organisations and Other Development Partners	n) Work in close collaboration with member countries and other stakeholders to develop and deliver relevant *capacity-building programmes*, including emerging priorities such as loss and damage as a result of climate change.	17
2. Low Carbon Development	Civil Society and Communities	b) Lead and contribute to *awareness campaigns and capacity-building in schools and communities* to promote and facilitate energy and ecosystem conservation and the increased use of renewable energy through changes in attitudes and behaviour.	20
3. Strengthened Disaster Preparedness, Response and Recovery	National and Subnational Governments and Administrations	f) Support existing and additional *capacity-building and awareness-raising for governments and communities (including churches and schools)* to improve their disaster preparedness, response and recovery capabilities, acknowledging they are often the first responders in the event of a disaster.	23

Source: [40,54].

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Table 12. Capacity-building references in international environmental frameworks for schools.

Section/Subsection	Code	Objectives	Page No.
Strategic Plan for Biodiversity 2011-2020			
E Enhance implementation through participatory planning, knowledge management and capacity building	ABT 19	By 2020, knowledge, the science base and technologies relating to biodiversity, its values functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.	n.p.
Kunming-Montreal Global Biodiversity Framework (KMGBF) 2022-2030			
C Considerations for the implementation of the framework	22	Implementation of the framework requires transformative, innovative and transdisciplinary *education, formal and informal*, at all levels, including science-policy interface studies and lifelong learning processes, recognising diverse world views, values and knowledge systems of indigenous peoples and local communities.	7
K Communication, education, awareness and uptake	40 (f)	*Integrating transformative education on biodiversity into formal, non-formal and informal educational programmes, promoting curriculum on biodiversity conservation and sustainable use in educational institutions* and promoting knowledge, attitudes, values, behaviours and lifestyles that are consistent with living in harmony with nature.	14
Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030			
II Expected Outcome and goal	17	Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, *educational*, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience.	12
IV Priorities/Priority 1: Understanding disaster risk at National and local levels	24 (l)	Promote the incorporation of disaster risk knowledge, including disaster prevention, mitigation, preparedness, response, recovery and rehabilitation, in *formal and non-formal education*, as well as in civic education at all levels, as well as in *professional education and training*.	15
	24 (m)	Promote national strategies to strengthen *public education and awareness* in disaster risk reduction, including disaster risk information and knowledge, through campaigns, social media and community mobilisation, taking into account specific audiences and their needs.	
V Role of Stakeholders	36 (a)(ii)	Children and youth are agents of change and should be given the space and modalities to contribute to disaster risk reduction, in accordance with legislation, national practice and *educational curricula*.	23

Source: [41,42,110].

5. Discussion

The study aimed to understand the status of environmental stewardship education in Tuvalu's elementary and secondary schools. Document analyses found that national policies provide only sporadic support for formal education, emphasising environmental stewardship. Environmental stewardship and biodiversity are closely related but are not explicitly specified as learning outcomes in the recently adopted outcome-based curriculum. Additionally, there is a mismatch between national policies and those at the regional and international levels.

In the global context, the Strategic Plan for Biodiversity 2021 and the newly endorsed Kunming-Montreal Global Biodiversity Framework urge the integration of biodiversity education into formal, non-formal and informal educational programmes. The Sendai Framework calls for incorporating disaster risk knowledge in formal and non-formal education and empowering children and teenagers to contribute to disaster risk reduction through educational curricula. The Sustainable Development Goal (SDG) 13.3 calls for increased education, knowledge, and capacity for climate change mitigation, adaptation, impact reduction, and early warning, resulting in responsible, resilient citizens. These recommendations have garnered support from scholars who advocate for integrating crucial concepts such as biodiversity [99], disaster risk reduction [100] and climate change [101] across all educational programmes.

On a regional scale, the Pacific Islands Framework for Nature Conservation and the Framework for Resilient Development in the Pacific promote conservation education and emerging forms of education to improve awareness of climate change, hazards, and disasters, and capacity for adaptation and risk management. It also emphasises the development of capabilities for conserving terrestrial and marine ecosystems and using renewable energy in schools and communities to build resilience.

At the national level, Tuvalu has developed its TNBSAP, *Te Vaka Fenua o Tuvalu*, and *Te Kete*, which set out the country's priorities until 2030. The TNBSAP encourages the formulation of biodiversity-relevant curricula streams and incorporates the teaching of biodiversity at all levels of schooling. *Te Kaniva* calls for integrating climate change and disaster risk management into the school curriculum. At the same time, *Te Kete* Strategic Priority Area 1 does not mention any capacity-building through formal primary and secondary education.

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Key international and regional policies emphasise the importance of educating students at all levels about environmental stewardship. This prospect was promoted by Bennett et al. [91] and Potter [102] as 'an education for the 21st century', while Thorne and Whitehouse [21] argue that it is a critical component of education *in* and *for* the Anthropocene. Rogayan [11] remarked that "environmental stewardship must be developed in every student to globally make a difference towards the resolution of some, if not all, problems in the environment" (p. 10). These have been reflected in Tuvalu's environmental policies, such as the biodiversity and climate change policies. A closer examination of what is happening in Tuvalu's schools in 2022, 6 years after the TNBSAP's implementation period ended (and while it is still in use until the revised version is ready), and two years after *Te Vaka Fenua o Tuvalu* and *Te Kete* has been in place, reveals a different picture. Several arguments are advanced:

A. Mismatch Between National Policies and Educational Integration Goals

The most important finding is a mismatch between national sectoral policies, where the demand for incorporating biodiversity at all levels of schooling and the mainstreaming of climate change and disaster risk reduction into school curricula is not currently reflected in existing education policies or school curricula. This suggests that the public sectors are not functioning in tandem as expected due to a working in-silos culture in which knowledge and information sharing across organisational boundaries is restricted. Without information, crucial priorities may be excluded from critical government programmes.

B. Challenges and Opportunities in Tuvalu's Education System

The Education Department in Tuvalu has adopted an outcome-based curriculum (OBC), which emphasises learning and teaching guided by pre-determined, predictable, and highly specified curriculum content and objectives. This upholds a foreign education system that is irrelevant to Tuvalu by perpetuating the practical perspective that education should prepare pupils for employment after school. There is a 24-60% unemployment rate in Tuvalu [103], with the majority of paid employment in-country being provided by the civil service. Other major forms of employment include fisheries, merchant shipping and seasonal fruit picking in Australia and New Zealand. The educational system should focus on relevant life skills, which would prepare school leavers to engage in productive activities within communities, including environmental stewardship. This is particularly relevant as there is now a shift in the focus of multi-lateral funders to support Nature-based Solutions [17]. Craney's [104] study found that the education systems in Fiji and the Solomon Islands continue to perpetuate colonial origins, which are incompatible with the people's demands. OBC restricts teaching and learning to predictable outcomes, resulting in a lack of creative and original ideas, leading to homogenous groups of followers rather than trailblazers [105] (p. 322).

However, the Tuvalu National Curriculum Policy Framework (TNCPF) represents a significant move away from the prevalent focus on Western scientific interpretations, which have overshadowed local environmental practices and beliefs. Traditional ecological knowledge, vital for adaptation, is often sidelined in educational curricula [17]. This omission disregards centuries of indigenous wisdom on sustainable environmental practices. Current formal educational provisions have failed to address the specific climate change impacts and adaptation needs of Tuvaluan communities. This disconnect further diminishes the relevance and effectiveness of climate education initiatives. The TNCPF represents an opportunity for Tuvaluans to see their own experiences and insights reflected in the education they receive. It also offers space for community participation in PBE and CBE in formal education where crucial local insights and perspectives have previously been excluded. For example, "life skills" for someone living in Nanumea, Tuvalu, are practical rather than theoretical – hands-on learning experiences are crucial for developing actionable adaptation strategies and improving environmental quality [106,107]. Additionally, community-inclusive and participatory approaches to ESE are essential for developing effective adaptation strategies rooted in local community needs [17].

C. Policy Inconsistencies and the Call for Political Will in Educational Reforms

Another issue is the inconsistency of policies within a government agency between education policies and school curricula. The TESP III and the TNCPF 2019 encouraged incorporating environmental stewardship-related issues in the school curriculum. However, disaster risk reduction

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has not been mainstreamed, and climate change was briefly referenced in the geography and biology curricula in Year 13. The findings of this research are consistent with those of [18], who highlighted that policy priorities are not always reflected in school curricula.

In order to achieve the full potential of the TNCPF, there needs to be political will to implement policy priorities and invest in educational reforms focused on ESE. Political will is also required to obtain funding, lobby regional implementing agencies (e.g. SPREP and the Pacific Community) and development partners (donors such as the European Union; Deutsche Gesellschaft für Internationale Zusammenarbeit - GIZ; Australian Aid; NZ Aid have all provided ODA for formal education projects in the Pacific region), and purge the influence of postcolonial education agendas and prioritise indigenous knowledge, community involvement, and culturally appropriate formal education practices to foster relevant environmental stewardship.

D. The Call for Early Introduction of ESE at Elementary Schools

The most important critical details in this research are that the most influential environmental stewardship-related teaching currently occurs at the upper secondary level, particularly in Year 13, a student's final year of upper secondary education. MEYS statistics from 2023 show that pupils in Year 13 make up only 28% of those who began in Year 1 in 2010. Additionally, these students are only introduced to environmental issues through two electives, geography and biology. Glackin and King [63] (p. 12) reported that geography is an optional GCSE subject that only 50% of students choose to take, leaving the other half of the population with very little environmental education after Year 8. ESE provision needs to begin at elementary schools in Tuvalu. ESE must be introduced at the primary level as this would be transformative in terms of increasing the resilience and adaptive capacity of communities – targeting primary-level education would have the most impact on improving community resilience [17].

E. Insufficient Environmental. Education Integration and Methodological Gaps

Fifth, currently, less than 2% of time is allocated for instruction on environmental stewardship, and activities for pupils to learn *in* (experiential learning) and *with* (affective learning) nature are absent from the curricula. Additionally, none of the curricula incorporates methods of instruction that foster self-identity, social action, alternative lifestyles, fundamental mapping skills, and environmental stewardship behaviour such as caretaking ethics, ecological activism, or avoidance of consumerism attitudes.

We used analyses of only environmental stewardship-related policies and curricula to understand the status of environmental stewardship in Tuvalu schools. Future research should include testing of educational materials, pedagogies congruent with environmental stewardship, teacher delivery and effectiveness, and students' perceptions of environmental stewardship education, monodisciplinary or infusion curricula, school leaders' perceptions and school ethos for inclusion of environmental stewardship education (ESE). Our analysis found significant misalignments between national policies and educational goals, emphasising the lack of integration of EE and methodological gaps. These findings highlight the urgent need for reforms to address inconsistencies, prioritise the early introduction of ESE in elementary schools, and elevate the importance of indigenous knowledge. Such reforms would foster community resilience and prepare future generations for sustainable environmental practices. The results of this study are valuable to both academic and policy discussions. They illuminate systematic problems, support changes, and encourage inclusive and prosperous EE and sustainability approaches. Additionally, they provide actionable insights that can drive meaningful change for policymakers, educators, and researchers alike.

5. Conclusions

Tuvalu's current curricula do not fully meet the formal environmental stewardship education standards outlined in national, regional, and international policies. This discrepancy is amplified by the fact that Tuvalu is one of the world's most climatically and biodiverse vulnerable countries. Integrating environmental stewardship-related concepts like biodiversity and climate change into national curricula has been neglected for the past ten years, even though these subject areas are

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stipulated in entrenched sectoral policies. Modules on environmental stewardship have not been taught in all traditional schools in Tuvalu.

Currently, the most effective delivery of environmental stewardship education occurs in Year 13, where only a few students benefit. To rectify this disparity and ensure comprehensive education, recommendations are proposed to instil a sense of environmental care at the policy level:

- Establish a consistent educational approach to environmental stewardship using both traditional (informal) and evidenced-based (formal) learning styles throughout a student's school career.
- An integrated national policy is needed to establish a vision for environmental education in all schools (elementary, primary, and secondary), including education about environmental protection, biodiversity conservation, climate change adaptation, and sustainability. The policy would guide future National Curriculum and assessment adjustments.
- The national policy should take into account the importance of learning *about* nature (cognitive learning), learning *in* nature (experiential learning), and learning *with* nature (affective learning), and ensure that these learnings are given equal weight throughout a student's school career.
- MEYS should ensure curricula reflect the three types of learning in bullet point 3 to foster enhanced levels of environmental care, concern, and activist engagement in students. This involves engaging them in concrete action, an Agaziz learning to 'study nature, not books.'
- MEYS can be requested to ensure that environmental stewardship is covered at the age of awe and wonder at nature, as well as the level at which most Tuvaluans complete their education. Recognising the significant dropout rates in secondary education, incorporating ES into primary school curricula could serve as a strategic approach to enhance environmental consciousness and bolster capacity for environmental care and protection.
- The Education Department should provide opportunities for teacher training programmes in EE, CC & DRR, and Biodiversity Conservation to strengthen their pedagogical skills before mainstreaming ES into the curriculum.
- Encourage cross-sectoral educational programmes from DoE, DCC, TFD, DWM, and DoA to be held in schools during the commemoration of Environment, Climate Change, and Biodiversity Days.

The study highlights a substantial disparity between Tuvalu's current curricula and ESE standards, exacerbated by its vulnerability to climate change and biodiversity loss, while the recommendations propose a solution: implementing a cohesive educational approach across all schooling levels, integrating EE through diverse learning styles, teacher training, and cross-sectoral initiatives. Future research directions could focus on investigating the potential benefits of the suggested alterations, assessing their enduring effects on environmental awareness and actions, and identifying approaches to address any potential obstacles that may arise during their implementation. Such investigations are particularly critical for small island developing states like Tuvalu. Furthermore, research may also explore the contribution of community engagement and indigenous knowledge to enhancing EE outcomes.

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