

Culturing Environmental Education in the Caribbean

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Abstract

This paper presents a detailed description and analysis of one aspect of the lives of villagers of a coastal Caribbean community—their knowledge of, and interaction with, the marine environment. Using the grounded theory methodology, meanings are extracted from the accounts of how villagers function in the marine environment. These meanings are analyzed in light of Stables' (1998) environmental literacy model which encompasses functional, cultural, and critical literacy. Against this backdrop, suggestions are made for “culturing” formal environmental education in the Caribbean school system, particularly for students from rural coastal communities. The point is made that the case study presented here is likely to be representative of several Caribbean coastal communities, particularly those that share a common historical background. Furthermore, case studies such as this one can be replicated in other types of communities in the attempt to gain the knowledge necessary for culturing formal environmental education in those communities.

Résumé

Cet article présente une description et une analyse détaillées d'un aspect de la vie des villageois dans une communauté côtière antillaise : leur connaissance de l'environnement marin et leur interaction avec ce dernier. Selon la méthodologie de la théorie empirique, des significations sont dégagées des témoignages sur le mode de fonctionnement des villageois dans leur environnement marin. Ces significations sont analysées à la lumière du modèle d'alphabétisation environnementale de Stable (1998), qui englobe l'apprentissage fonctionnel, culturel et critique. C'est sur cette toile de fond que nous proposons des modes de « culturalisation » de l'éducation environnementale formelle telle qu'elle est pratiquée dans le système scolaire des Antilles, surtout lorsque cette éducation est destinée aux étudiants provenant des communautés rurales côtières. Nous stipulons que le cas étudié dans cet article est vraisemblablement représentatif de plusieurs communautés côtières des Antilles, plus particulièrement celles dont l'histoire est commune. Par ailleurs, de telles études de cas peuvent être répétées dans d'autres genres de communautés afin de recueillir les connaissances nécessaires à la culturalisation de l'éducation environnementale formelle pratiquée au sein de ces communautés.

. . . the environment is not a single or simple element but a composite of nature, “man-made” structures and societal factors. However, the critical relationship is between people and nature. (Thomas-Hope, 1996, p. 5)

Environmental education could be regarded as an attempt to enhance this critical relationship through education. The emphases in looking at critical relationships have changed over time. Whereas earlier ideas set achievement of a balance between man and the rest of nature as the parameters of environmental education, later attempts to define environmental education stress concepts of sustainability and human development. As Vidart said more than 20 years ago: “modern man does not inhabit an ecosystem. He is not in direct contact with the biosystem; he is so through the social system and the technosystem” (1978, p. 471).

Stables (1998) cites Schama and McKibben to make the same point. Schama explains how areas of assumed wilderness have been shaped by human culture over a millennium, while McKibben claims that no natural event or place on Earth is free from human intervention.

Stables uses this fact as one of the supporting arguments for regarding environmental education as the development of certain kinds of literacy. Since the environment is moulded by human hands, it is susceptible to action predetermined by human value systems and cultural norms. Therefore approaches derived from the arts and humanities as well as from the sciences may appropriately be used to study it. He uses the terms functional, cultural, and critical literacy from language development and applies them to environmental education.

Functional environmental literacy he sees as embodying accumulated environmental knowledge, which will keep on growing. But it also includes the ability to make an informed guess using observation, that is, some skills are involved. This knowledge base is important, but environmental education must move beyond this, and use the knowledge to inform value judgements.

Cultural environmental literacy, Stables suggests, refers to the ability to recognize and understand the significance of natural images in human culture; why and to whom they are significant. Both functional and cultural literacy are seen as necessary conditions of critical literacy, which alone can facilitate action. Critical literacy implies having the power to develop an understanding of the factors that contribute to environmental change, and to be able to translate that understanding into appropriate environmental action.

The literacy model offers an avenue for planning and evaluating curricula in environmental education. It suggests basic and more complex levels of environmental education, and leaves the door open for interdisciplinarity by calling on the arts and humanities as well as the sciences in environmental education.

The model also makes it quite clear that although technical environmental knowledge and skills are a necessary component of environmental education,

they do not constitute the concept in its entirety. Active concern and commitment informed by the knowledge and skills is the test of environmental education.

This paper presents a detailed description and analysis of one aspect of the lives of villagers of Seablast, a coastal Caribbean community—their knowledge of, and interaction with, the marine environment. Meanings are extracted from the accounts of how villagers function in the marine environment and these meanings form the backdrop against which suggestions are made for “culturing” formal environmental education in the Caribbean school system, particularly for students from rural coastal communities such as Seablast. It is to be noted that the case study presented here is likely to be representative of several Caribbean coastal communities, particularly those that share a common historical background. Furthermore, case studies such as this one can be replicated in other types of communities in the attempt to gain the knowledge necessary for culturing formal environmental education in those communities.

Environmental Education in the Caribbean

For the archipelago of islands that comprise the Caribbean, environmental education is vital. They have common problems of ecosystem fragility, isolation, small size, and vulnerability to hurricanes and earthquakes. Additionally, the economies of all the territories are heavily resource based. Traditionally, there have been the sugar and banana industries. The 20th century witnessed the rapid growth of the petroleum, bauxite, and tourist industries. The region is now regarded as the most tourist dependent area in the world. So the conservation and care of the physical environment are of enormous importance for the region. This translates into the necessity for an environmentally literate and committed society.

Over the years, there have been many regional workshops aimed at advancing environmental education in the Caribbean. One outcome of all this activity has been the re-evaluation and revision of curricula and programmes, especially for the primary and secondary levels of the formal education system. The following analysis is an attempt to formulate one strategy for encouraging environmental education at these levels—a strategy deeply rooted in the background cultural experiences of students.

Environmental Education and Culture

Definitions of culture in the literature have been heavily influenced by the work of anthropologists. Even so, there is no consensus in this group. One dichotomy that exists pits “culture as behaviour” against “culture as shared meanings.” For example, Colletta (1980) defines culture as behaviour that comes

about as a result of shared meanings. However, Barrett (1984) focuses more on the shared meanings acquired by observation, imitation, and instruction at the hands of members of a particular group, as the essence of culture.

In the arena of science education, increasing attention is being paid to the cultural aspects of students' background experiences that might be impacting on their learning of school science. Aikenhead (1999), in pursuing this line of work, draws on the definition of culture given by Phelan, Davidson, and Cao (1991) as the "norms, values, beliefs, expectations, and conventional actions" (p. 228) of a group. This definition encompasses the notion of culture as behaviour as well as the notion of culture as ideas and meanings. This straddling of the approaches to culture is adopted in this paper.

In the process of examining the interface between environmental education and culture, there is the need to distinguish between formal and informal environmental education. In most communities, and particularly in rural ones, some informal education occurs with respect to matters pertaining to the environment. In this regard, one can consider the beliefs of community members with respect to the environment and the ways in which they interact with the environment as part of the culture. In short, there is no need for "culturing" of informal environmental education.

The picture is somewhat different with respect to formal environmental education as it is carried out in schools in the English speaking Caribbean. Here, discipline-based curricula are often replete with opportunities for infusing environmental education concepts (for example, in content areas dealing with interdependence, imbalance, and resources in nature). Culture, however, is largely presented in the curricula as the history and manifestations of customs, especially in the art forms, and not so much as depicting a worldview. Suggested curricula activities/requirements do not transparently encourage the examination of cultural practices, sayings, and beliefs in the development of environmental education concepts. The theoretical underpinnings of such curricula are more likely to be based on the culture of conventional science. (For a discourse on conventional science as a sub-culture of Euro-American society, see Aikenhead, 2000). If, however, we accept the premise that children bring their local background experiences with them to school, and that these experiences can have strong cultural components which may impact on their learning of what school has to offer, then it becomes clear that these background experiences should be investigated and exploited for maximum benefit in the teaching/learning process in school subjects, including environmental education.

The Research Setting and Procedures

The research reported here was conducted in the Caribbean island of Trinidad, in the rural coastal fishing village of Seablast. This study was part

of a much larger research project in which the villagers' ways of life in many spheres of activity were observed, documented, and analyzed (George, 1995). This was a qualitative, instrumental case study, with the subject of study being the traditional practices and beliefs that guide villagers' lives. Data were collected primarily through semi-structured interviews with villagers ranging in age from high school students to the elderly. In all, 75 individuals (38 male and 37 female) and 7 groups of students (35 boys and 30 girls altogether) were interviewed.

In the context of this study it seemed expedient to straddle different approaches to culture. In the absence of previously documented data on the behaviour and the products of behaviour of the villagers of Seablast, a necessary first step was to document and describe these before moving on to the abstractions from the behaviour. Geertz (1973) stresses the need for those studying a culture to move beyond expressing their findings in terms of patterns, tables, rules, and so on, to the point of extracting meaning.

The grounded theory methodology (Glaser & Strauss, 1967) was employed as the main analytical tool with the interview data. The design format allowed for in-depth descriptions, analyses, and interpretations of meanings generated in a single setting. This paper focuses specifically on that part of the project dealing with villagers' beliefs about, and interaction with, the marine environment.

Villagers' Orientation toward the Marine Environment

Values Associated with the Marine Environment

Practically all villagers view the sea and the marine environment as a resource that contributes to their physical well-being and to their livelihood in general. In this regard, sea water is used for medicinal purposes; the sea is a source of food, and fishing is a regular occupation for many villagers, mostly men.

Uses of sea water. Villagers use the sea water itself as a form of medicine in many different ways. Bathing in the sea on a regular basis is regarded as a good habit since the salt from the sea water is thought to be a good "tonic" for the body. Bathing in the sea is encouraged from infancy:

Q: What about the sea-bathing. How early could you start to bathe the baby?

A: You could bathe the baby in the sea, but don't go too early in the morning.

Q: What I mean is how old the child should be?

A: From about 4 or 6 months. When the child is younger than that, the salt is too strong for the child eye.

Q: So, when you're bathing them at six months you have to be careful not to get the . . .

A: Sure. You have to be careful. You have to keep the child's face up. If you want to soak the head, you have to keep the child face up and you wet the head.

Q: When you come from the sea with the baby, do you wash off the salt-water from the baby?

A: No. It just like some big people, when they come from the sea, they not washing off the salt at all. Some, . . . like the salt choking them, they must rinse it off

. . .

Q: What accounts for that, that some people could keep the salt on their skin and some can't.

A: Well, some people glad for it. Is a tonic, you know. The water wholesome. (Female, Age ?)

Apart from serving to maintain good health, sea baths are also thought to serve a curative function. The action of the waves on the joints is thought to cure rheumatism and arthritis. The sapping of joints with seaweed dipped in sea water is also thought to cure these illnesses.

Sea baths are also used to get rid of fevers and colds, particularly "head colds." The efficiency of the process can be increased by ingesting a mixture of sea water and lemon juice:

If you have a cold now, the sea good, you go down by the sea and take a bath, walk with a sour orange and a calabash and you take up a little sea water, make sure it have no sand in it and squeeze your sour lemon in the water and drink that. Eventually, two, three days your cold gone. The same things we use the doctors put it in scientific names and it is the same thing in your backyard. I don't go to the doctor. (Male, 51 yrs.)

Some high school girls described the mixture of sea water and lemon, with some molasses added, as an effective agent for removing eczema. Others simply recommended bathing in the sea and rubbing the skin with seaweed or other herbs to get rid of the eczema.

Nutritional value of fish and other seafoods. The sea is a major source of food in the village. Young and old alike extolled the nutritional value of seafood, particularly fresh seafood. Fish, as well as other sea animals that feed on seaweed, are thought to be particularly nutritious. No detailed explanation for this was identified, but there was the general feeling that such seafood obtained something nutritious from the seaweed which was in turn passed on to humans who ate the seafood.

The seaweed *Gracilaria sp.*, referred to locally as "sea moss," is used to make a drink that is thought to be very nutritious. This seaweed is first bleached in the sun and then boiled in water to produce a gel-like substance. This gel is mixed with milk and made into a drink which is used by infants, children and adults.

"Pacro," which is a mollusc, is also regarded as being highly nutritious. Some villagers claim that it enhances the virility of males (in local terms, it is good for the man's "back"), but others dispute this claim. Everyone, young and old alike, agrees that it has great nutritional value:

Q: What about things for your own personal health?

A: Sea moss, pacro water.

Q: Do you dive for your own sea moss?

A: Dive? No. When tide low you go and organize some moss from the rock. The sea moss does grow on the rock. You have to get some nice long beards, some nice long strands. You carry it home and you put it in buckets or a barrel and squeeze some lemons in it to take out the freshness and then you bleach it. You put it in the sun on galvanize and wet it every day until it come clear. When the colour become whitish, then you dry it dry, dry, dry, crisp, crisp.

Q: All of you drink that?

A: Yes. You boil it. That is thing for the back.

Q: Tell me about the thing for the back.

A: Pacro water. That is for the older men, men in their thirties. Like we, it is sea moss and peanut punch. (High school boys, 16-17 yrs.)

Seafoods were also described as cures for bad nerves and for goitre. In the case of goitre, the iodine from the seafood is thought to be the active agent.

The art of fishing. Villagers regard the acquisition of knowledge of the marine environment as critical for proper functioning in everyday life. In addition to knowledge of the medicinal value of sea water and the functioning of the sea as a source of food as described above, villagers (particularly the older ones) have detailed knowledge of the nature of the sea and how one can function in the sea as a fisherman. Not only do villagers possess this knowledge, but they also feel that without this knowledge and associated skills, one is practically helpless.

In order to be a good fisherman, villagers feel that it is absolutely necessary to know the marine environment intimately. One must know about climatic and environmental variables such as the tide, the weather, and the moon. One must also know about fishing gear and the various types of fish and their peculiar habits: “[Fishing] is a thing, you have to know what you are doing.”

Villagers view the moon, the tide, and the weather as having significant influences on their ability to obtain good catches. They recognize that these are fixed factors over which they have no control, and adopt the philosophy that one must co-operate with that over which one has no control in order to reap maximum benefits.

The moon is thought to influence the fish population directly. The popular opinion was that the tide and the phases of the moon are connected in some way although no full explanation was obtained about this connection. It is believed that one should not fish during a full moon because the catch would be small. One young villager reasoned that the fish could see during a full moon.

In other instances, villagers referred only to the tide when describing the best times for fishing. For several of them, “dry” or “lowering” tide was the best. Thus, while there was general agreement that there are factors in nature that affect the fish population, there was not always agreement on exactly what these factors are.

It is felt that the weather impacts directly on a villager's ability to fish. Several fishermen outlined that rains did not deter them from fishing, but that heavy seas did. Heavy seas are thought to be due to strong winds. Strong winds also affect the fishermen's ability to use their fishing lines properly.

A fisherman must be able to detect changes in the weather and make appropriate decisions if he is to survive at sea. It is also felt that an experienced fisherman can "read" the clouds and predict what the weather would be like. Some informants did not give any guidelines on how one might "read" the clouds but they did state (or imply) that experience was a key factor:

Well, you see . . . you see, first on the land it have, you call it, "ground sea." That's high waves on shore, so you really can't go out. The boats and them, you can't push it out by the jetty then. The waves are high, so you can't take no chance to go out. And when the weather—how you will know the weather will get bad and thing (is) by the clouds. Yeah. You see different clouds. Fishermen will read the clouds. Who could read the clouds does get "dey" signs up dey, and you have to move out quick, see if you could bolt in to the nearest shore so you get back in. (Male, 30 + yrs.)

In addition to using wind directions to locate his position at sea, the fisherman in the village also uses landmarks to aid in this process. When a fisherman is moving in the direction of a landmark, he is said to be "running" on the mark.

It is believed that there are specific fishing grounds for certain types of fish, of which the fisherman must be aware. The fisherman must also be able to navigate successfully to these spots.

A: You don't go about fishing red fish like you fishing ordinary fish. You have to take marks from the land, say, like you have a mountain and you have to tie it with a next mountain. Well, this is an experience you have to know for your own self. By telling you this, you will hear what I say but you can't do it. You will only think about what I am saying. But you have to tie the pot . . . with the red fish, mountain to mountain and you have to know the hills. Say, you have to know that is Seablast and Seablast have a hill name Mt. Zion or Mt. Gay as the thing may be. You have to know and then you'll take that direction to go out and catch your fish.

Q: What do you mean by tie?

A: Well, you see, if one hill here and the next hill here, you have to go now in the direction to get these hills to come together.

Q: So, you see both of them in the same straight line.

A: Same straight line. Regardless that one in Seablast and one may be in Shaddock, you have to put the one in Seablast, because if you going so, you have to put the one in Seablast to come on top the one in Shaddock, so that means you have to go in that direction until you bring the one in Seablast on the one in Shaddock, then you really know that you making fishing ground. If you didn't do this, the chances that you may catch, but you are not on the ground. (Male, 60 + yrs.)

The above extract also illustrates a more sophisticated way of using landmarks. Here, the fisherman is describing a procedure that involves more than

“running” on a mark. The procedure has a confirmatory component built into it that involves “tying” a mark with another one. It is also noteworthy that this fisherman (and several others too) stressed the importance of knowledge gained *through direct experience*.

In addition to the belief that certain fish may be found in specific locations, there is also the belief that some fish spend most of their time near the sea-bed whereas others are to be found near the surface of the water. This has implications for the technique used to catch the fish:

A: The red fish is a different thing. You have to go on the spot you get it.

Q: How many hooks?

A: You have to have four or five hooks. You come and you gauge up some hooks and tie it on the line about, let us say, 36” long, which is about 3’ and you put down that on a sinker which is about 3 pounds and you ride, you carry that right down to the bottom because it is a bottom fish.

Q: It’s a bottom fish?

A: Yes. That does be underground. Then you have to send down that on the ground.

Q: What is the difference between catching a bottom fish with the hook and a surface fish. What is a surface fish?

A: The surface fish is the carite, cavalli, and king fish and you have like moon-shine; that is surface fish. Ground fish is like red fish, grouper, dogteeth snapper. These are like ground fish. They feed on the ground. That does not mean, occasionally, you wouldn’t ketch them on the surface, but he is not living on the surface. You find him more on the ground and those fish more feed on moss and thing on the ground, so you have to know where they are to go and catch them. The surface fish—you buy a piece of nylon with hooks, put a hook with a bait and you going with the engine and that floating on the water. (Male, 60 + yrs.)

Here again, knowledge of the specifics of the environment is brought to the fore. The fisherman must go to the right “spot” to catch red fish. This implies that he must first know the spots where red fish can be found. He must also be able to manoeuvre his boat in an appropriate direction to ensure that he is “. . . making fishing ground.” Three types of equipment for fishing were described: fish pots, nets, and fishing lines. The different types of equipment are used to catch different types of fish.

Fishing is perceived in the village to be a craft based on an interplay of knowledge, skill, and experience. Some of the knowledge is specific to the local context. For example, one must know the appropriate landmarks that must be used when setting out to sea to catch red fish. If one does not drop one’s line or one’s pot on the correct “spot,” the expedition is likely to end in failure. But, there is also knowledge of a more general kind. Carite fish must be caught with moving (as opposed to a “dead”) bait and, presumably, this rule will hold regardless of the site of fishing. Similarly, red fish is a “bottom” fish and must therefore be hunted in an appropriate manner.

Repeatedly, the fishermen stressed that one had to “see” what they were talking about in order to understand fully. In other words, experiential

knowledge is valued highly. It was emphasized that the knowledge about fishing was passed on in the apprenticeship mode:

A: You see, what I understand about fishing, when my father uses to fish and so on, whatever he knew and whatever techniques he knew, I learn by seeing what he does and that is how information pass down to me, or, you meet the old fella by the beach and you start talking about fishing and he would show you how to use line. (Male, 51 yrs.)

It is strongly believed that knowledge is developed and experience gained through direct involvement in activities in the appropriate context. As one villager put it: "Plenty things around nature, but you have to be around nature to understand it."

This orientation can be aligned with research in the area of situated cognition. This emerging line of research seeks to present an alternative way (to that of cognitive psychology) of accounting for the ways in which people learn and act in specific situations. An important premise of the emerging theory is that the social, cultural, and physical circumstances in which actions are situated are important aspects of the process of learning and knowledge generation (Brown, Collins, & Duguid, 1989; Hennessy, 1993). In other words, ". . . knowledge is situated, being in part a product of the activity, context and culture in which it is developed and used" (Brown, Collins, & Duguid, 1989, p. 32). This analysis of practices and beliefs, with respect to the marine environment, has thrown up situated knowledge and associated skills which can be used as a vehicle for culturing formal environmental education in this context.

Summary and Discussion

Several aspects of local knowledge with respect to the marine environment surfaced in this study. There is knowledge about climatic and environmental variables, the feeding habits of fish, the nutritional value of seafoods, and so on. There is also procedural knowledge, for example, knowledge of how to use landmarks to tell one's position at sea.

In addition to the local knowledge base in the community, the research also unearthed messages that were implicit in the practices and beliefs. These messages can be summarized as follows:

- The environment provides us with what we need to maintain health;
- One must be knowledgeable about one's environment;
- One must possess the necessary skills to function effectively in the environment;
- Knowledge about the environment is best gained through direct experiences;

- There are aspects of the environment over which we have no control and with which we must, therefore, cooperate; and
- Knowledge is power.

Indeed, the sentiments towards the environment were, perhaps, best expressed by the male villager quoted above: “Plenty things around nature but you have to be around nature to understand it.”

Villagers’ knowledge base, as outlined, seems to satisfy Stables’ first level of environmental literacy: the functional level. Actual knowledge of natural phenomena, as well as the skill of making informed guesses, is represented in villagers’ observations. There is, for example, intimate knowledge about physical conditions of the sea—the movement of the tides, the action of the waves, and the weather conditions that affect them. Habitat preferences of familiar marine flora and fauna are known, in particular those of fish and of seaweeds.

The manipulation and mental skills needed to “manage” the environment in order to reap sustenance from it are there both in dealing with man-made equipment, and in villagers’ ability to use knowledge of habitat and weather conditions to find the best sources of fish and other seafood. As well, there is the recognition that whatever actions are taken, one must “go with the grain” of nature if they are to be effective. Success depends on co-operation with, and respect for, those forces of nature over which one has no control. All this knowledge might be regarded as representative of a measure of functional environmental literacy among villagers. This is not unique to the villagers of Seablast; there are several accounts in the literature of settings where traditional knowledge forms the backbone of villagers’ existence. The publication, *Indigenous Knowledge and Development Monitor* (www.nuffic.nl/ciran/ikdm), provides many such accounts from developing country contexts.

Children growing up in an environment such as Seablast would have acquired at least some of these aspects of knowledge, skills, and attitudes directly or indirectly from their elders. So they would have some functional environmental literacy. In any case, they take the ideas to the classroom, where they can be used to encourage such literacy. In addition, what they have acquired links them with the value system of the community, and therefore can be regarded as conferring a measure of cultural environmental literacy.

But these kinds of environmental literacy, though necessary, are not enough, because they do not lead to committed debate or action. Serious debate has to be informed by knowledge, and must be “grounded in an awareness of the norms and values” of culture, but only critical environmental literacy can bring about desirable change. It is this attitudinal and action-oriented emphasis in achieving critical environmental literacy that is inherently difficult, and makes standard pedagogical practice of moving from the “familiar” to the “new” of crucial importance in environmental education. Hence, it is most appropriate to use environmental ideas that are already a

part of the society and its children as a starting point for promoting the understanding of, and concern for the environment, which will lead to on-going action in its favour.

Very many of the knowledge claims agree with current “official” ideas, for example, the recognition of “surface” and “bottom” fish. But it is true that not all of them do agree. The significant influence of the moon, in which villagers believe, is a case in point. This does not detract from the usefulness of the ideas in the teaching/learning context. What it does mean is a difference in the way the ideas are used. Those aspects of local knowledge that are in agreement with ideas as taught in schools could be used as a base for the reinforcement of such ideas. Those not in agreement would present cause for a questioning and re-examination of both sets of knowledge. In either case, the ideas would become platforms for extending environmental knowledge.

There is an emerging body of literature that examines the ways in which different groups of students mediate the various “worlds” that constitute their lives. The notion that students can make automatic switches from one context to another and operate without any hindrance in the new context has been seriously questioned. Writing from a North American context, Phelan, Davidson, and Cao (1991) describe the problem thus:

On any given school day, adolescents in this society move from one social context to another. Families, peer groups, classrooms, and schools are primary arenas in which young people negotiate and construct their realities. For the most part, students’ movements and adaptations from one setting to another are taken for granted. Although such transitions frequently require students’ efforts and skills, especially when contexts are governed by different values and norms, there has been very little study of this process. (p. 224)

Phelan, Davidson, and Cao (1991) use the term “world” to refer to the different contexts in which students operate and define a world as “. . . cultural knowledge and behaviour found within the boundaries of students’ families, peer groups and schools” (p. 225). It would seem necessary, then, that strategies be devised for helping students in contexts such as Seablast to negotiate the boundaries between the worlds of school (where conventional science is used to explain natural phenomena) and home (where they are exposed to local knowledge pertaining to many aspects of their lives, including the environment). The prime aim of such strategies should be to provide teaching/learning situations that allow students the opportunity to compare and contrast the local knowledge with school science and, based on this evaluation of what each has to offer, make informed choices that would impact on their life.

If one is to move beyond the basic literacy levels, however, one has to attempt to take the ideas beyond knowledge, to promote an understanding of the factors that lead to environmental change. For example, villagers’ experiential knowledge of tide and wave action, and of the habitat preferences of

marine organisms needs to be extended to the consequences of man-made effects on these through the positioning of buildings, mangrove and reef destruction, and pollution. Similarly, care in the physical collection of sea moss, or a discussion of the maturity of fish caught, could be a starting point for an understanding that there are specific patterns and cycles in nature regulating the lives of organisms, and maintaining equilibrium. So, there are limits to the quantum of these sources of food that nature can provide on an ongoing basis. Just as it is recognized that there are natural forces that demand co-operation if humans are to survive, so for the indefinite renewal of these sources of food, there are “rules of reaping.” The productive capacity can only be maintained indefinitely if immature plants and fish are left behind at reaping times, and given enough time to regenerate before they are next reaped. In other words, the concepts of carrying capacity and sustainability must not only be understood, but must govern action.

Implications for the Classroom

If one is to pursue the strategy of using cultural practices, ideas, and beliefs as a vehicle for encouraging environmental literacy among students at the primary and secondary level, there are several factors that need to be borne in mind. These include the following:

- *A need for on-going teacher education.* Teachers have to be familiar with the culture knowledge base, and know how and when to use it. This also implies a willingness to improve their personal environmental content constantly as is required, and to use unfamiliar teaching/learning methodologies and techniques.
- *The necessity for administrative and financial support.* This kind of support is needed at national, community, and school level. The unequivocal policy and financial support of ministries of education is paramount. Community expertise and other assistance facilitate success, while the willingness of school administrators to be innovative in terms of time, subject discipline, and other arrangements is vital for the smooth running of programmes.
- *A need for curriculum analysis and revision.* This would be a new approach to environmental education, and would require adequate thought and planning, involving ministries, communities, school administrators, teachers, and students as well as individuals with known expertise in environmental education.
- *Research.* Local universities would need to facilitate the research needed into various areas, not only to unearth the cultural knowledge, but also to experiment with methodologies and approaches to environmental education, using this medium. The potential usefulness of culture in enhancing environmental education is not limited to experiences pertinent to the marine environment.

Whatever the effort demanded, it would be worth it in terms of the linkages that could be established between communities and educational institutions, and the relevance of environmental education it would bring to students and communities alike.

Notes on Contributors

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