EDITORIAL CRITIQUE OF <u>SUNSHIP EARTH</u>

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EDITORIAL CRITIQUE OF SUNSHIP EARTH

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ABSTRACT

Analysis of environmental problems indicates to environmentalists and environmental educators that the way people "think" about natural systems is incompatible with the nature of the biosphere. Conceptualization of living systems involves integration of many diverse elements. The focus of this thesis is an analysis of the _Sunship Earth_ curriculum materials written by Steve Van Matre and designed to introduce Grades Five and Six to the properties of ecosystems. Two questions are addressed: First, what concepts of natural systems are presented (promoted) in this curriculum material; second, how do these concepts compare to views of natural systems described by environmentalists and environmental educators?

The curriculum material is analyzed through the methodology of editorial criticism. Editorial criticism describes how the design or content pattern of the curriculum material reflects the priorities and decisions made during its development. Chapter 2 outlines the basis of this type of educational evaluation while Chapter 3 outlines the specific methodology used to analyze _Sunship Earth_. The analysis focuses on two questions: What is the author's concept of natural systems (intended view); and, what is the concept of natural systems which is structured by the learning activities of the program

(operationalized view)?

Van Matre's _Sunship Earth_ is analyzed as an example of curricular material designed to address the concerns of environmentalists and environmental educators. This five-day outdoor program for Grades Five and Six combines a sensory awareness, acclimatizing approach to natural environments with the goal of teaching ecological concepts.

The analysis of _Sunship Earth_ involves two components. First the views of natural systems offered by environmentalists and environmental educators are outlined and summarized in Chapter 4. The emphasis is on the views presented prior to the publication of _Sunship Earth_. The second component of the analysis is the editorial critique itself, presented in Chapter 5. It consists of a description of the underlying perspectives in Van Matre's intended view of natural systems and his operationalized view as presented in the emphasis, sequence and content of the curriculum material. A discrepancy between the two views is described within the social context of the environmental movement and environmental education.

Chapter 6 outlines criteria for assessing the degree of success of the critique. The aims and validation principles of editorial criticism are listed and addressed.

DEDICATION

To my parents

ACKNOWLEDGEMENT

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CHAPTER 1

An Introduction

> The dropping tide leaves glassy pools of water in holes
> or cracks. Clusters of white foam burst at the surface
> in the wake of the beating surf. Seaweeds of many
> colors line the walls and cast deep shadows; the vivid
> green strands of hair-like confetti, the heavy brown
> stems of kelp, the paper thin blades of red laver...
> Animals occupy every available space... Hordes of
> easily found rocky shore creatures, many brightly
> colored or of such bizarre shapes that they seem
> unreal. (Snively, 1978, pp. 52-53)

Descriptions of natural systems[1] often ask the reader to look

closely at organisms in their habitats; at their variety, adaptations

and community associations. They offer "perceptions" to aid the

beginning naturalist viewing, for example, these rocky shore habitats.

Many lessons are also designed with the intent of introducing students

to, and increasing their knowledge of, various ecosystems; rotting

logs, open fields, ponds, forests and sea shores. Curriculum

materials aid in directing the interaction between the student and

specified components of these ecosystems. The goals, objectives,

learning activities and evaluation methods of the curriculum serve to

outline the facts and theories, methods of investigation and means of

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[1] The definition of natural systems used here is "any system which
does not owe its existence to conscious human planning and execution
... [this then includes] man himself and many of the multi-person
systems in which he participates" (Laszlo, 1972, p. 23).

communication to be used in the interaction.

The implementation of the curriculum exposes students to more than the facts, theories and experiences outlined for each habitat. It also presents a "view" or concept of what natural systems are. The focus and format of the learning activities presumably emphasize what is "best" in terms of the type of questions to ask and the sort of investigative methods to use in learning about natural systems. A general view of the inherent characteristics of natural systems is implicit and/or explicit in the emphasis, sequence and structure of the curriculum content and its proposed learning experiences. By directing the design and selection of experiences intended to promote an understanding of the natural environment the curriculum's concept of natural systems potentially structures the format of student conceptualization.

The connection between curriculum "design" and conceptualization is clarified by considering the general process by which understanding is developed. Hirst (1974) describes this process as occurring "through the use of categorical and conceptual apparatus" (p. 23, 44). Understanding involves "a progressive differentiation of our experiences through the acquisition of new concepts under which it [experience] is intelligible" (p. 23). Thus, the process of understanding natural systems is not a mental accumulation of facts, theories and experiences. It involves an active process of developing "frameworks" for interrelating these experiences, facts and theories.

Subsequent exposure may reinforce, alter or eliminate the concept, thereby maintaining, enhancing or altering the prior understanding. The building of concepts must be viewed as an active, ongoing and integral part of (always) coming to know about natural systems.

This view of concept building as a component of understanding implies that the type of exposure which people have to natural environments will not only direct this conceptualization but will also have an impact on subsequent interactions and decisions involving natural settings. "What we see or understand about any situation is not a simple given. It is dependent on those concepts and categories, those basic units of intelligibility, which the mind brings to the situation" (Hirst, 1974, p. 23). New perceptions and understandings gained are determined, at least in part, by the presuppositions and conceptualizations carried from previous learning experiences.

The importance of prior conceptualization and its effect on our view of natural systems is emphasized by environmentalists and environmental educators. Environmentalists criticize the "frontier view" of natural systems utilized by the western industrialized society, while environmental educators state that the experiences and information provided in schools must become "environmentally sound". Both have proponents calling for the development of an environmental ethic; an ethic built on a conceptual framework integrating the properties of natural systems and "appropriate" associations between "man" and these systems. The thrusts of such observations and

proposals indicate that environmentalists and environmental educators feel that the way many people "think" about natural systems is incompatible with the actual nature of the biosphere. Presumably, prior experiences with natural systems have not provided sufficient understanding (or an appropriate conceptual framework) to prevent destructive interactions between "the student" and natural systems.[2]

Conceptualization establishes a framework from which the individual derives understanding. The existence of environmental problems indicates that individual conceptualization involved in understanding natural systems, has resulted in a framework leading to incompatible interaction between "man and nature". Which components of the framework contribute to this distortion? What aspects of conceptualization of natural systems would support an environmentally "sound" understanding (as described by environmentalists and environmental educators)? Two aspects of this distortion in conceptualization of natural systems serve as specific examples of the problem: (1) the interaction of affective and cognitive components in concept development; and (2) the presence of concept "domains" outside of which the use of a particular concept is considered inappropriate.

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[2] Those destructive interactions are viewed by environmentalists on a global scale - questioning man's ability to survive as a species.

The Interaction of Affective and Cognitive Components in

Concept Development

Affective refers to the emotional or feeling aspect of experiences and learning, while cognitive refers to the "activity of the mind in knowing an object to intellectual functioning" (Brown, 1971, p. 4). Thus, learning attitudes and/or values falls in the affective domain, and intellectual learning (e.g. identification, classification, ... synthesis) is cognitive. "It should be apparent that there is no intellectual learning without some sort of feeling, and there are no feelings without the mind being somehow involved." (Brown, 1971, p. 4).

Historically, teaching/learning has emphasized the cognitive domain, in some cases, to the active exclusion of the affective components. This varying emphasis is notable when contrasting one orientation to curriculum with another, for example academic rationalism to child-centered curricula (Eisner, 1979). Academic rationalism focuses on the "great works of man" as a source of curricular structure while child-centered curricula derive their direction from the interests of the student. In terms of the "distorted" view of natural systems of concern here is the emphasis in the affective shown by subject-centered curricula (Joyce & Weil, 1972; Ornstein, 1982).

Much of a student's conceptualization of natural systems occurs through the subject-centered curriculum of science. The structure of

this type of curriculum relies on the subject content of the sciences. The "structure includes those unifying concepts, rules and principles that define and limit a subject and control the methods of research and inquiry" (Ornstein, 1982, p. 405). In most cases this learning process involves accumulation of facts, theories and research methodology with a strong emphasis on the cognitive processes. Thus, for example, personal awareness, valuing and reflection are expected to occur as coincidental outcomes of the study of the science disciplines. The problem is that pressures of learning and the large volume of information coupled with de-emphasis of the affective domain may result in accumulation of "science" facts as opposed to a conceptualization of, in this case, natural systems.

Moreover, based on the importance of objectivity and the reductionist approach to science methodology, the emphasis of the subject centered curriculum is placed on the parts as opposed to the whole. The natural environment is visualized as consisting of isolated components interacting in a manner definable by "physical" laws. Accumulation of discipline formatted information may tend to build a fragmented view of natural systems. In addition, as an activity of accumulated learning by a whole society, explicit science statements are not necessarily "tangible" at the "individual" level (Bronowski, 1978). All of these aspects of the subject discipline may contribute to a de-emphasis of the personal experiences of the individual and fragmentation of the conceptualization process.

Moving away from a fragmented conceptualization of natural systems means shifting the emphasis to their dynamic "wholistic" properties. Interestingly, various authors suggest that this will require active incorporation of the affective domain. Wholistic properties include such attributes as the diversity of interactions among environmental components and the timing, sequencing and changing characteristics of living systems. Thus, the focus shifts to such properties as harmony, rhythms and patterns inherent in biological systems. It is believed that making this shift requires a change in the involvement of the learner. Interested in discerning "the pattern which connects" all living systems, Bateson (1979) emphasizes the importance of aesthetics, stating "logic and quantity are inappropriate for describing organisms and their interactions and internal organizations" (p. 9). "Seeing" this pattern is believed to involve recognition and empathy. Other authors point to the importance of utilizing forms of the affective domain in the interactions between the "student" and "reality" when studying the patterns of living systems (Bronowski, 1978; Leonard, 1972; Roszak, 1979; Zukav, 1979). These perceptions suggest it is appropriate to incorporate a means of conceptualization designed to integrate affective and cognitive aspects of learning about natural systems.

The Presence of Concept "Domains" Outside of Which the Use of a Particular Concept is Considered Inappropriate

Another aspect which can distort conceptualization is the impact of the context on the information when it is presented to the "student". The context, or "situational components" (temporal and spatial), "fixes the meaning" of communication (Bateson, 1979). Altering the context will alter the conceptual understanding (Hirst, 1974). It may be enhanced, shifted or make some components of the concept (or context) appear irrelevant. This is to be expected since "the whole... is not perceived in any one view but grasped only implicitly as the single reality which is shown in all these views" (Bohm, 1981, p. 8). Thus "new" experiences with "the whole", i.e. presented within "new contexts", may occur at different "orders" or levels of organization, providing insight which is conceptually different from prior experiences. It follows then that concepts provide clarity within certain "limits" set by the context of their first construction. Extended beyond these limits, the understanding may become unclear and possibly distorted. "If we transgress the rules of the relationship which the concept meaningfully permit, we necessarily produce nonsense" (Hirst, 1974, p. 25).

The natural environment is a multi-faceted, multi-leveled system. Conceptualization assists in understanding each aspect or level of the environment focused on within the given context. The resulting concept is useful within certain "limits" as set by the context.

Extended beyond these limits, as stated previously, the "understanding" may become unclear and even distorted.

Of interest here are the factors associated with monitoring this interaction between the context and the conceptual framework, in elucidating the nature of natural systems. At two points the interaction between conceptualization and context is critical: in the initial process of concept structuring" and, in the subsequent use of the concept in the same or a "new" context. The multi-faceted, hierarchical nature of the natural environment suggests that "context awareness" must become an important component of programs designed to study natural systems. Such awareness will both define the limits of a specified concept and ascertain its association relative to other concepts. Further, context awareness is of fundamental importance to acquiring skills which ensure appropriate concept use. Coupled with the incorporation of affective curricular components, these aspects of conceptualization might ensure a closer "match" between the way we "think" about natural systems and the way they are (as described by environmentalists and environmental educators).

Proposal

This thesis focuses on gaining a perception of conceptualization which will enhance the understanding of natural systems in an "environmentally sound" manner. It was felt that analysis of the process(es) involved should provide insight into the origin and

structuring of the conceptualization of natural systems (as well as areas of compatibility/incompatibility between the concept(s) and the natural environment). There are several factors which influence this conceptualization. Many are outside of the educational system, including economics, and social and cultural views of nature. Other factors, which are more immediate components of the educational environment include the school and classroom environment, the teacher's perspective, the student's perspective, the curriculum emphasis and the organization of curriculum materials. Of concern are those "educational" factors which are designed to help students learn about the natural environment; specifically, it was decided to analyze an environmental education program incorporating (to some degree) the concerns of conceptualization (the affective domain and context) outlined above. Two questions are considered here: first, what are the concepts of natural systems promoted/presented in such curricula and curriculum materials; second, how do these concepts compare/contrast to views of natural systems described by environmentalists and environmental educators?

The purpose of this thesis is to address the above questions through the use of a curricular critique called editorial criticism. This evaluation methodology is outlined for analysis of curriculum materials (Eraut, et al., 1975; Werner, 1981). Generally, the intent of the critique is to describe how the organization and content of a curriculum reflects the decisions made during its development.

Editorial criticism (Werner, 1981) specifically focuses on the curriculum author's role in the development of the materials and the consequences of his or her choices in the presentation of concept(s) there. The focus here is the concept of natural systems, inherent in the design of curriculum material, aimed (by the author) at promoting conceptualization and an environmentally sound understanding of natural systems. Thus, through editorial criticism two questions are addressed:

1. What is the (curriculum material) author's concept of natural systems? [Intended View]

2. What is the concept of natural systems which is "outlined" by the learning activities of the program and is this view consistent with the author's intended view? [Operationalized View and assessment of internal consistency]

In addition, both "views" are compared/contrasted with "environmentally sound" conceptualizations described by environmentalists and environmental educators.

The rational basis and description of this form of educational evaluation (more specifically, curricular material analysis) is outlined in Chapter 2 under the following headings: "Values and Implications for Curriculum Development" and "Curriculum Criticism and

Analysis of Curriculum Materials". A complete description of editorial criticism makes up the last section of Chapter 2 and the beginning of Chapter 3.

The specific curriculum material chosen for analysis is Van Matre's _Sunship Earth_ (1979). This is a five-day environmental education program outlining outdoor experiences for grades five and six. It includes clear statements and descriptions of the author's philosophy, goals of the program, daily schedules and learning activities, as well as complete scripts of some "key" presentations and teacher-student interactions. The approach taken in _Sunship Earth_ is offered by Van Matre (and his coworkers) as an alternative to the more traditional "empirical" study approach to investigation of natural systems. It combines a sensory awareness (affective domain) approach to natural environments with a goal of teaching specific ecological concepts in the context of residence in a natural setting.

Sunship Earth was written after the publication of two other books by Van Matre: _Acclimatization_ (1972) and _Acclimatizing_ (1974). The first books describe the philosophy and goals of an "acclimatizing" approach to studying natural systems. Various activities are listed and described which emphasize development of individual sensory awareness within living systems and ecological conceptual understanding. The goals of _Sunship Earth_ differ in two ways from those of _Acclimatization_ and _Acclimatizing_: first, it is specifically designed for schools; and second, it includes a specific

mechanism for conceptual development called IAA (inform, assimilate, apply).

Concept(s) of natural systems inherent in this combination of ecological conceptualization and sensory awareness within the context of a natural setting can be articulated using editorial criticism. Van Matre clearly offers Sunship Earth as an example of "good" environmental education, designed to generate a natural awareness which will lead to a more effective treatment of environmental problems by each individual. Through editorial criticism Van Matre's "intended view" can be outlined and contrasted to the "operationalized view" (structured in the design of the curricular material). These views are described and discussed against the backdrop of concepts of natural systems described by environmentalists and environmental educators during the 1960s and 1970s.

In summary, the editorial critique of Sunship Earth consists of two major tasks. The first involves a brief outline of the views of natural systems discussed and described by environmentalists and environmental educators. This summary is presented in Chapter 4 and Appendices A and B. It provides the "backdrop" for the second task which is the major focus of the thesis: an internal analysis (designed to elucidate the author's intended and operationalized view of natural systems) of an example environmental education curriculum (Sunship Earth). This documented analysis is presented and summarized in Chapter 5 and Appendices C and D. Chapter 6 discusses the degree of

"success" of this editorial critique.

Before moving to the critique, however, I must clarify the philosophical background and structural components of editorial criticism and its "placement" in educational evaluation. This description comprises Chapter 2.

CHAPTER 2

Curriculum Criticism as a Form of Educational Evaluation

This chapter begins with the basic premises which are accepted when choosing curriculum criticism as an evaluation method. These premises are outlined as they relate to the purpose of this thesis and will be further elaborated on in the chapter. The background philosophy and description of curricular criticism, analysis of curriculum materials and editorial criticism as tools in educational evaluation make up the main body of the chapter.

Basic premises:

1. Curriculum development (including learning materials) can effectively be viewed as an editorial process. The author selects aims, goals, and evaluation methods, from a "universe of possibilities". He or she makes these choices from her (his) own philosophical stance regarding what is "best" in terms of a learning environment, evaluation, etc. This stance is a value-laden one.

2. The design of the curriculum material reflects the "meaning system" of the author. Analysis of it, along with social context considerations, can serve to build

a reflection of

a. the philosophical stance taken by the author in the structuring of the program (for example, outlining the intended view of natural systems) and

b. the mechanism through which the author feels his (her) philosophical stance will be realized (for example, the operationalized view of natural systems).

3. The intended view and the operationalized view may or may not "match". Consideration of any discrepancies between them clarify each, as well as, provide information in directing any future development of alterations.

4. Literature of different disciplines (e.g. science, economics, environmental education...) suggests that society needs to change the way it "thinks" about natural systems. The transition period (encompassing a shift in thinking from a "frontier view" to, for example, an environmentalists' view of natural systems) is overflowing with rough descriptions of "how" and "to what". Some of this information has been incorporated into the design of new curricular programs. Curricular

criticism can serve as a method for assessing the current position of a curriculum in this "transition" zone, as well as, providing guidelines for subsequent "changes" and/or growth.

Curriculum Criticism and Analysis of Curriculum Materials as Tools in Educational Evaluation

Describing the concept(s) of natural systems presented by a curriculum necessitates an understanding of both curricular structure and the developmental process which generated this structure. Eisner (1979) outlines three "curricula" which he states govern the learning consequences of a program (or "schooling"); the explicit, implicit (hidden), and null curricula. These are viewed here as components of an overall curricular structure which contributes to the development and alteration of an individual's concept of natural systems.

The explicit curriculum consists of the stated goals, objectives, learning activities and evaluation procedures governing the focus of study. This includes clear statements of program rationale and program organization, behavioral objectives, learning strategies, and suggested teacher-student-content interactions. Here the content about natural systems, in terms of focus, facts, theories and methods of investigation, is clearly delineated.

The implicit, or hidden, curriculum consists of that "pervasive and ubiquitous set of expectations and roles that define schooling" (Eisner, 1979, pp. 91-92), the program or the curriculum material. This refers to those values, curriculum orientations, presuppositions, and expectations inherent in the organization of the educational program. In effect, they determine the choices made during the development of the curricular material. They may or may not be explicitly stated, but are an inherent component in the structuring of the curricular material.

The third curriculum determining the form of the program is the null curriculum. It consists of "the options students are not afforded, the perspectives they may never know about, much less be able to use, the concepts and skills that are not a part of their intellectual repertoire" (Eisner, 1979, pp. 91-92). In other words, the decision **not** to include a particular learning strategy or theory about living systems can be reflective of the concept of natural systems being promoted, as well as of the author's views of learning, students, teaching, and so on.

The desire is to use an evaluation method which "considers" the impact of all three curricula on the conceptualization of natural systems. All three curricula are expressed (to varying degrees) through the curriculum development process. An analysis, focusing on conceptualization of natural systems (presented through the interaction of three "curricula") is possible using curriculum

criticism. A description of the presuppositions and aims of curriculum criticism, as well as its placement in educational evaluation serve as background, clarifying the reasons for choosing this evaluation methodology. The rest of Chapter 2 is organized under the following two headings: A. Values and their implications for curriculum; and B. Curriculum criticism and the analysis of curriculum materials.

A. Values and Their Implication for Curriculum Development

> The selection of a beginning point is a statement of values. (MacDonald and Clark, 1973, p. 407)

Curriculum development can be viewed as consisting of a series of stages including identification of goals, formation of objectives, selection and organization of content and learning activities, evaluation of the process and resulting program, and implementation (Gibbons & Commons, 1980). Each stage of the process involves consideration of alternatives and then selection, thereby making decisions about where to focus (not to focus) and what to include (exclude). It is generally accepted that the basis of each choice is the result of a value position taken by the author.

> Values are the primary data source for selecting purposes for schooling and for all subsequent curriculum decisions. (MacDonald & Clark, 1973, p. 407)

The values of the curriculum developers may or may not be explicitly known to the user or stated in the curriculum material. However, where the values of the author are consistent, the selection process throughout development will be expected to be consistent with that value system. The result will be a program or curriculum material which operates not only to transfer information or skills but does so within an identifiable value-framework. Such a framework has, in itself, information to be utilized in concept development.

Clarification of the meaning of the terms value and valuing is necessary to describe their impact on curriculum development. In the Merriam- Webster's dictionary (1964) value is defined is being "something (as a principle or quality) intrinsically valuable or desirable", while valuing means "attributing a value to a certain thing, action or entity". The intent here is to clarify the impact such "principles or qualities" can have on the decision-making process and, thus, on how the values are manifested in the content of the curriculum material. Further elaboration of the definitions is necessary to convey a more "operational or descriptive" look at the possible impact of values on decision-making.

Values are described by Rescher (1969) as being those factors which allow for the evaluation of and reasoning about one's actions by providing a context with reference to a "vision of how life ought to be lived". They exist as a framework for judging and choosing, and "represent a slogan capable of providing for the rationalization of

action" (Rescher, 1969, p. 9).

With this concept of value in mind, Rescher describes two ways by which the presence of values can be ascertained. The first is through the talk of an individual when he/she is rationalizing (defending, justifying, critiquing) his/her or another's actions. A second overt manifestation of values is found in the actions of the individual; in the "ways [they expend] resources of time and energy" (Rescher, 1969, p. 2). Through these two means values are expressed, and direct an individual's action. Thus, Rescher (1969) outlines two sources available for the analysis of an individual's value system: (1) Budget Analysis (the pattern expenditure of time and energy) and, (2) Content Analysis (rationalization of action) (Rescher, 1969). Of key importance here is the connection between the value system of the individual and the direction it provides in rationalization of action and the focus of resulting "work".

In a similar manner, Raths et al. (1966) describe values and valuing in an "operational" sense. Their concern is the connection between valuing, schooling and the student. The components of values, and hence of valuing, are clearly delineated. They are described as any attitude or belief or action which shows all of the following properties:

1. chosen   (1)   freely
                 (2)   from alternatives
                 (3)   after thoughtful consideration of
                       the consequences of each alternatives
2. prized   (4)   cherished, being happy with the choice
                 (5)   willing to affirm choice publicly
3. action   (6)   doing something with the choice
                 (7)   repeatedly, in some pattern of life

(Raths, et al., 1966, p. 30)

Thus, the groundwork is laid for identifying and describing aspects of individual value pattern through their rationalization and actions.

For both Rescher (1969) and Raths et al. (1966) values manifest themselves in the speech and actions of an individual. Values are their concept about "how life ought to be" and presumably, the person will strive to direct their thoughts and actions by this framework.

The power of values to direct an individual's thoughts and actions is also apparent when considering concept development as a component of understanding new systems. Rescher (1969) states that "the prevalent values of a society, particularly of a democratic society, significantly condition the ways it conceives of, and goes about discharging its business" (pp. 4-5). Values form part of the conceptual framework through which we view and explain new experiences. Thus, they play a significant role in guiding our perception and determining "what is possible" (Rescher, 1969). The "concepts of categories" which are the "basic units of intelligibility" described by Hirst (1974) include a value framework.

The construction and alteration of these basic units is accomplished under the influence of "valuing".

Development of curriculum programs or materials occurs under the influence of a value system consisting of "what is possible" and containing a vision of how life (learning) ought to be lived. The strength of this perception and its impact on the product of curriculum development is obvious in the five orientations to curriculum described by Eisner and Vallance (1974). These clearly stand as examples of how a vision of what "ought" to be in classrooms torques the curriculum framework to address the issues of the value emphasis. One example is developed here to clarify the point.

The influence of a specific value framework on curriculum development is apparent when comparing the developer's attitude about what education should accomplish to the focus and construction of their curriculum program or material. For example, consider the orientation titled "social reconstruction-relevance". This orientation views "individual development and the quality of the social context as interdependent ... and seeks to develop a better "fit" between the individual and society" (Eisner & Vallance, 1974, p. 11). Thus, the aims, goals, learning strategies, and other curricular components, arise from an analysis of societies' needs.

There are two forms of this orientation, however, which differ in their view of social change and, thus, formulate quite different curricular programs or materials. One form, called social adaptation,

seeks to maintain the basic social structure (Eisner, 1979). The intention is not to seriously question social values but to meet existing social demands. Characteristically the learning environment (or components of the curriculum) include objectives and activities equipping students with the beliefs and skills for maintaining and improving the "status quo". The second form of this orientation, social reconstruction, seeks a fundamental change in social structure. The objectives and learning activities focus on development of "critical consciousness among children and youth so that they become aware of the kinds of ills that society has and become motivated to learn how to alleviate them" (Eisner, 1979, p. 63). Within this one orientation, then, a fundamental difference in the view of appropriate interaction between "schooling" and "social needs" results in curricula with fundamentally different focuses and frameworks.

The value pattern of the curriculum developer thus contributes to the structuring and final framework of the curriculum program or material and thereby formulates and reflects the "curriculum meaning system" of the author. The process of development involves a series of decisions. At each point choices are made based on beliefs, attitudes, and presuppositions about schooling, education, learning, knowledge and the roles of teacher/students. Many of the decisions are made without conscious awareness of the operation of these "value indicators". The resulting program or material consists of explicitly stated goals, objectives and learning activities, and an implicit view

of education, learning, knowledge and the content area. This
"implicit" value pattern creates the context in which the explicit
curricula evolve. Further, the value pattern also influences the null
curricula, those components of education, learning, knowledge and the
content area which are not appropriate, or not a priority, for the
specified task.

> All educational practice implies a theoretical stance
> on the educators part. This stance in turn implies...
> sometimes more, sometimes less, explicitly... an
> interpretation of man and his world. It could not be
> otherwise. (Friere, 1970, in Werner, 1978, p. 15)

The author's "value pattern", intertwined through the three curricula
will hereafter be referred to as the "meaning system" structuring the
curriculum.

B. Curriculum Criticism and the Analysis of Curriculum Material

Curriculum criticism[1] is a method of educational evaluation which
offers a mechanism for focusing on the value pattern or "meaning
system" shaping curricula, programs, or materials. It supplies a
means of appraising the implicit (hidden) and null curriculum, as

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[1] Criticism is viewed here as described by Werner (1981): "a
judging of the roots or foundations of something." It is not to be
"misconstrued as an attack or an apologetic in defense of some idea"
(Werner, 1980, p. 143).

reflected in the explicit curriculum. There are many intertwined
value components which make up the meaning system structuring the
curriculum package. These include inherent views of effective
student-teacher interactions, appropriate contexts for learning as
related to the subject area, role of teacher/student in learning, and
others. The critic can choose to focus on one or more of these
components.

> Some appraisal of the content of the curriculum in
> terms of its intellectual significance and the covert
> messages it might convey seems an appropriate focus for
> the evaluation of the curriculum. (Eisner, 1979, p.
> 177).

Such an appraisal can occur through curriculum criticism and can
begin with analysis of curriculum materials. It is generally
acknowledged that teachers rely heavily on curriculum materials,
especially textbooks and associated workbooks, when clarifying
objectives and planning student activities (Anderson & Tomkins, 1981).
These curriculum materials serve as an initial influence in directing
the type of information and learning activities presented and utilized
in the classroom.

In order to deal effectively with the task of defining and
describing curriculum criticism and its use for curriculum material
analysis, the rest of this section has been divided into the following
subsections: 1. Curriculum Criticism and Orientations to Educational
Evaluations; 2. Curriculum Criticism: Defined and Described;

3. Analysis of Curriculum Materials and Editorial Criticism.

1. Curriculum Criticism and Orientations to Educational Evaluation

Various forms and methodologies of educational evaluation exist. Each is designed to "make sense" of curriculum programs and materials, but the type of "sense-making" that is made depends on the orientation or "frame of reference" which the evaluator (or decision-maker) brings to the evaluation (Werner, 1978). Curricular criticism is a form of evaluation which has a "critical interpretation orientation", quite distinct from the two other forms of evaluation considered here: the situational interpretive orientation and the more traditional "empirical-analytic orientation" (Aoki, 1978; Werner, 1978).

The critical interpretative frame of reference focuses on making explicit those hidden presuppositions, assumptions, values and beliefs which are interwoven in the curricular program or materials. The evaluator asks questions which probe at the values and beliefs upon which the program is based. Once explicitly stated, the implications of these assumptions are reflected upon. Both the analysis and subsequent reflection are meant to provide a clarification of the "situation" to enable movement toward reorientation and change (Werner, 1978). Werner states these tasks of critical sense-making more specifically as a series of questions:

1. To make explicit perspectives (of man, knowledge, etc.)
   underlying programs:
   1.1 What are the underlying intents?
   1.2 What are the underlying assumptions?
   1.3 What are the underlying approaches?

2. To make explicit social relations maintained and
   legitimized through perspectives?
   2.1 What teaching relations are implied?
   2.2 What views of students are implied?
   2.3 Whose interests are being served?

3. To make explicit sources of these perspectives:
   3.1 Are the root metaphors appropriate?
   3.2 What are the implications of "borrowing" these
        metaphors from other fields?

4. To make explicit the control function of these
   perspectives:
   4.1 What "knowledge" is selected and neglected?
   4.2 In what ways do these perspectives allow/
        disallow us to see?
   4.3 Who has the power to control?

5. To make explicit arguments/criteria/standards for
   changing these perspectives:
   5.1 What alternative perspectives can be considered?
   5.2 Are these perspectives "ethically" justifiable?
   5.3 Are these perspectives consistent with our basic
        values and views of man?

<div align="center">(Werner, 1978, p. 19)</div>

Note the focus on identification of underlying presuppositions, their origin, effect (control), and possible appropriate alternatives. The aims of the "critical orientation" to evaluation include disclosure of meaning, extension of knowledge about curricula, and preparation for change (Eraut, et al., 1975; Mann, 1968; Werner, 1978). The goals of this orientation are not specifically decision-oriented inquiry (Eraut, et al., 1975; Willis, 1978).

The aims and tasks of the critical orientation vary considerably from those of the more traditional "empirical-analytic" orientation to educational evaluation. This second frame of reference makes "sense" of curricular programs or materials by an ends-means form of analysis. In other words, the analysis involves assessing the relationship between the "means" (learning activities, teaching methods, curricular materials, etc.) and the "ends" (aims, goals, stated objectives) (Eisner, 1979; Werner, 1978). The techniques used measure goal achievement "in order to make judgments about the system's efficiency... as well as to increase the certainty and predictability of achieving the prespecified outcomes" (Werner, 1978, p. 7). Formative and summative evaluations are examples of ends-means forms of analysis. Popham (1972) defines them as "determining the quality of educational means which are designed to accomplish the ends originally decided on through needs assessment" (treatment adequacy assessment). Essentially it is a process of "assessing merit" (with a view to making a decision) by judgmentally comparing the "performance data" of the curriculum program with a desired "standard or criterion of acceptability" (Popham, 1972, p. 2)

The tasks of ends-means evaluations are also outlined by Werner as a series of questions:

1. To assess the degree of relatedness between means and
   ends:
   1.1 How effective are the means in achieving the ends?
   1.2 How much consistency is there between and among
       the objectives, content, resources, and strategies
       of the program?
   1.3 How much certainty (precision) is there in
       predicting (achieving) the specified outcomes?

2. To compare this relatedness among programs?
   2.1 Which program is the most cost effective and
       time efficient?
   2.2 Which program produces greater net increases
       on outcome performance indicators?

                    (Werner, 1978, p. 11)

Note the emphasis on determining the "effectiveness" of a program in a

means-ends assessment, as opposed to the focus on presuppositions in

the previous orientation to evaluation. This emphasis occurs

primarily to aid in decision-oriented inquiry (Eraut, et al., 1975).

Data about the program are gathered, analyzed and then related to

values and standards of the evaluator and/or decision maker(s)

(Alexander & Saylor, 1974; Scrivens, 1967).

A third orientation to evaluation, outlined by Werner (1978) and

Aoki (1978), is the situational interpretive frame of reference. This

"sense-making" involves situational knowledge; attributing meaning to

things in a given context. "The task of the evaluator is to uncover

the relevance and meaning which a program has for the various groups

involved: students, parents, teachers, etc." (Werner, 1978, p. 13).

Again, Werner outlines the specific tasks in more detail as a series

of questions:

1. To make explicit the perceptions of various groups:
   1.1 What constitutes the "program" in the view of
       the participating groups?
   1.2 Do they perceive the program as meaningful,
       relevant, and appropriate to their own
       situations and concerns?
   1.3 What are the perceived strengths and concerns?

2. To make explicit the situational setting of a program:
   2.1 What frames of reference do participating groups
       bring to the program? (e.g., cultural and experi-
       ential frames of reference, intentions, back-
       ground, values).
   2.2 What is the place and understanding of the program
       in the larger school and community context?

                    (Werner, 1978, p. 14)

These three orientations to educational evaluation make it

possible to gain a more accurate picture of what is happening in

student-teacher interactions and the educational environment designed

to promote learning/understanding and development of knowledge. Not

only does the enterprise have prespecified aims and goals, it also

involves people interacting with people, each with unique personal

knowledge. A complete understanding of the educational environment

will only come when understanding includes information from each of

the three frames of reference: critical analysis; means-ends

analysis; and situational analysis. The focus in this paper involves

the disclosure of meaning task outlined for the critical

interpretative frame of reference.

2. Curriculum Criticism Defined and Described

Curriculum criticism has arisen as a form of educational evaluation in response to the belief that understanding an educational event requires more than a means-ends analysis. The emphasis has been, too long, on the product of the curricular program.

> Concern over the product of education seems somehow to obscure the fact that the world the educator creates through the curriculum is a world inhabited by actual children as well as by potential adults. (Mann, 1968, p. 14)

As indicated by the focus of the situational and critical orientations to evaluation (described above) true understanding of curricular events can only come when the elements of aesthetics and science are combined in evaluation schemes (Mann, 1968; Werner, 1981; Willis, 1978).

Curriculum theorists and evaluators concerned with the lack of attention paid to methods of "sense-making", other than a technological and scientific approach, have turned to the humanities to increase the principle and methodological dimensions of the curriculum field. Both the humanities and the curriculum field are "concerned, on the practical level with the artistic or aesthetic aspects of the representation of ideas, and on the theoretical level with critical judgment about how this task is carried out" (Willis, 1978, p. 95). This redefinition and expansion of curriculum evaluation has included development of methods which are consistent

with the general considerations of the humanities. Of interest here are the considerations for educational evaluation which are drawn from literary criticism (Kelly, 1975; Mann, 1968; Willis, 1978).

The primary aim of curriculum criticism, as a form of the critical orientation to evaluation, is to disclose the "meanings" inherent in curricular programs or materials (Mann, 1978; Werner, 1981; Willis, 1978). A basic premise of this analysis is that curricular programs are similar to literary work in that the design of the work constitutes an assertion of meaning. This "meaning system" is an integral part of the curriculum, apparent as an interconnecting component of the curricular work (Mann, 1968).

Curriculum development is the focal point of this premise. It is viewed as a process of making unconditional[2] selections from a "universe of possibilities" (Mann, 1968); a series of selections delineating, for example, aims, objectives, learning activities and forms of evaluation. The selected elements are not "real" or the "only choice" but, instead, are representations of what is considered to be "real". Selection is done by the author.

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[2] Mann emphasizes that, as with "works of art" there are conditional and unconditional elements impinging on the process of curriculum development. "Thus to regard an object-of-art, or a curriculum-as-art, as unconditional is not to forget that it is also conditioned, but merely to look at it and talk about it in its Art-fullness" (Mann, 1968, p. 4).

> Selection is fixed in a complex set of other choices,
> both about what to represent, how to represent it, and
> in what context to represent it. The selection made,
> considered against the infinite background of
> selections passed over, constitutes an assertion of
> meaning. (Mann, 1968, p. 3)

Presumably, the items which are selected are chosen as a result of their intrinsic value or "worth". This "worth" is judged by the author. Accounting for the presence of "a choice" as part of the curriculum focuses on the meaning of the choice. Thus, accounting for the combination of choices (e.g. framework and components of the curriculum material) serves as a reflection of the meaning system operating during the decision-making process. "If meaning is expressed as unconditioned selection from a universe of possibilities, then the form of the meanings asserted is the design, or patterns of relatedness, of the selections" (Mann, 1968, p. 4).

Thus it can be asserted that the "design of the selections" reflects the meanings of the program. Pulling a single item from the pattern of a curriculum program or material would therefore not be meaningful in itself. The selection is only meaningful "in relation to the other items" (Mann, 1968). Explaining the relations among the selections (constituting the design of the curriculum) discloses the meanings which are embodied in the author's selections (Mann, 1968; Willis, 1978). Focus is, thus, on identification of the assumptions and principles which the design entail. "The critic discloses meaning by explaining design" (Mann, 1968, p. 5).

a. The Critic: Characteristics And Tasks

How does the critic deal with this overall task of "disclosure of meaning by explaining design"? What are the phases through which a critique evolves? What are the basic requirements of the critic to move through these phases? Werner (1980) defines a critic as "one who makes a root judgment". In this light criticism "becomes at the same time a judging (in the sense of a process, a method of systematic analysis) and a judgment (in the sense of an end product, a public description)" (Werner, 1980, p. 143). Note the focus of the critic's task involves a systematic analysis, as well as a public description.

Kelly (1975) views a critique as consisting of four overlapping phases, each of which contributes to the understanding of a particular phenomenon: description, analysis, interpretation and evaluation. None of these aspects of the critique occurs in isolation from the others, but all are specific aspects of a critique which must be addressed. Eisner (1979) describes three of these in more detail:

> Description aspect of criticism
> An attempt to identify and characterize, portray or render in language the relevant qualities of educational life. (Eisner, 1979, p. 203)

> Interpretive aspect of criticism
> Provide understanding of what has been rendered by using, among other things, ideas, concepts, models and theories from social science and history. (Eisner, 1979, p. 211)

Evaluative aspect of criticism
> Assess the educational impact or significance of the
> events or objects described or interpreted. This
> assessment of events must be grounded in some view of
> what counts within an educational perspective.
> (Eisner, 1979, p. 211)

These aspects of the critique are structured in a way which elucidates

the presuppositions of the curriculum material, their origin and

impact on the curricular program (in terms of what has and has not

been included), and the possibilities for change (Werner, 1978).

Movement through these phases might be seen as involving selections of

(i) a focal point for the critique, (ii) an appropriate methodological

framework for the analysis of that focal point, and (iii) an

appropriate component of public dialogue.

(i) Selection of a Focus for the Critique

As the author of the curriculum material was faced with selection

of curricular elements from a "universe of possibilities" so is the

critic. He/she must select a focal point of investigation, as well as

one of interpretation, in an effort to convey an aspect of the work's

meaning. The selection points to aspects of the curricular work

considered to be of some significance. This selection by the critic

clearly "represents his/her own assertion of meaning" (Willis, 1978,

p. 97).

Selection by a critic of a focal point from among the many

designs in the work to be explained is described as follows:

a. It involves a transformation from a practitioner's "technological mode" to a critic's "aesthetic mode". This means that the curriculum material (or program) is viewed as "designs or events which are expressions of meaning, not data about the productive system" (Mann, 1968, p. 10)

b. It "is a matter of what one's personal (not subjective) knowledge leads him to see as valuable and fruitful". This aspect of the selection emphasizes the role of a "personal knowledge" which, in a curriculum critique, "is grounded in principally knowledge about ethical reality"[3] (Mann, 1968, p. 7). Thus the "dimensions" of what will be sought are set.

c. Eisner describes the selection as an "act of knowledgeable perception" (connoisseurship[4]). In education the development of connoisseurship "requires an ability, not only to perceive the subtle particulars

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[3] Mann (1968) describes ethical reality in terms of the initial selection process: "Personally held and universally intended knowledge about good and evil or right and wrong stands as a valuable guide to the processes of the curriculum critique" (p. 7).

[4]Connoisseurship - defined by Eisner as the art of appreciation, a private act which recognizes and appreciates the qualities of a particular work (Eisner, 1979, p. 193). Eisner describes criticism as the art of disclosure and states that "connoisseurship provides the fundamental core of realization that gives [criticism its] material. Educational connoisseurship requires the " ability to perceive the 'rules' through which educational life is lived".

of educational life, but also to recognize the way those particulars form a part of a structure within the classroom" (Eisner, 1979, p. 195).

d. Selection will depend on the critic's purposes "as well as the kinds of maps, models and theories being used" (Eisner, 1979, p. 198).

These considerations of factors which govern the selection process emphasize the importance of the critic's "personal" knowledge in fixing on a focal point for investigation.

The appropriateness (significance) of the focal point selected by the critic is assessed by determining (a) the degree of internal consistency between the critic's comments and the methodology employed in the analysis (Willis, 1978) and (b) the ability of the critique to disclose and explain the meaning within the curricular work (Mann, 1968; Willis, 1978).

(ii) Choosing an "Appropriate" Methodological Framework

The desire to assess various aspects of the presuppositions, or conceptual and theoretical framework of curricular programs or materials, has given rise to different methodological frameworks (Werner, 1981). No one methodological approach can be viewed as the best since the methodological principle which is appropriate for assessment of one focal point may not be appropriate for that of a

different focal point (Willis, 1978).

The impact of the "critique focus" on the methodological framework is apparent by considering a few examples of the curriculum criticism approach. Addressing the critique question to the type of experiences which curriculum materials present to students, Vallance (1977) asserted that there are basic similarities in the origin and purpose(s) of curriculum materials and works of art. She focused on the aesthetic and experiential qualities of the curriculum program as a product of human construction.[5] Using the language of art criticism her analysis presented possible "reader" responses to the curriculum material as a "viewer" would respond to a piece of art.

Literary criticism is also used as a means for selecting a focal point and a methodological framework for curricular analysis. Kelly (1975) describes four concepts of literary criticism (metaphor, point of view (voice), plot (order) and theme) which he feels could be used to develop curricular critiques. The basic premise which must be accepted is that the similarities between the components of literature and those of the organization and presentation of curricular materials are sufficient to allow the use of literary language to describe

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[5] Another methodological framework for analysis of the aesthetic dimension of curriculum (as a form of human experiencing) involves the use of phenomenological analysis. The precedents for its use differ from those above, focusing on "the experiencing of the world by ourselves and others from which we can learn something about the nature and structure of the world and the nature and structure of experience." Phenomenology brings with it a methodology and structural framework for analysis (Willis, 1978).

inherent meanings within the structuring of the curricular materials.

Also drawing on literary criticism for a methodological framework of analysis, Willis (1978) suggests four possible focal points for the qualitative analysis of a curricular material: the author, the work, the world or the audience. Each focal point would require development of alternative methodological principles. Werner (1981) outlines the components of a critical method, called editorial criticism, for analysis of curricular materials. Focusing on the role of the author in developing curricular materials, he equates the author's work to that of an editor. The role of the critic is then described in terms of an editorial critique, and a methodological approach is outlined.

Several authors point out that there are actually few examples of curricular criticism available (Eraut et al., 1975; Kelly, 1975; Werner, 1980; Willis, 1978). Werner's editorial criticism is the most explicit and identifiable as a single critical method for analysis of curriculum materials. Willis (1978) states:

> the best critic is the one who has the largest number
> of flexible, explanatory methodologies at his disposal
> and the intelligence to know how and when to apply a
> methodology for appropriate humanistic purposes. (p.
> 102)

The methodological framework chosen must be "appropriate" in that it provides data relevant to the context of the study. Relevance is determined, in part, by the ability of the critique to "unveil" basic curricular presuppositions, allowing for an interpretation of the

curriculum and preparation for change.

(iii) A Critique Involves Public Dialogue

Generally, curriculum criticism must involve a component termed "public dialogue" (Eisner, 1980; Munby, 1979; Werner, 1980). Distinguishing between connoisseurship and educational criticism Eisner (1979) points out that while "connoisseurship is a private act", criticism involves either a "public judgment or a public description" (p. 195) of the qualities of the curricular material or program.

Also addressing this issue, Munby (1979) states that the critic must do more than focus on revealing implicit curricular messages. He must communicate with the "practitioner" for "anything less than this may result in the effort of criticism fostering something like disdain rather than the sort of acknowledgement good criticism deserves" (Munby, 1979, p. 247). Werner supports this view and, for editorial criticism, outlines types of public dialogue which could be included when assessing the validity of the critique. The description of the second validation principle begins with:

> Criticism is a public task, not a subjective concern in which the critic describes curricula in terms of his or her own tastes. A curriculum, too, is a public event... Criticism, therefore is concerned with a reciprocal, not private, understanding of a program.

3.   Analysis of Curriculum Materials and Editorial Criticism

Curriculum materials continue to play a key role in determining what happens in the classroom (Anderson & Tomkins, 1981; Orpwood & Souque, 1984). To a large extent, they define the curricular aims, content, sequencing and forms of curriculum evaluation to be implemented. "The textbook and its partner, the workbook, provide the curricular hub around which much of what is taught revolves" (Eisner, 1979, p. 27). Inherent in the explicit content of this teaching-learning material "is the way in which certain topics will be regarded" (Eisner, 1979, p. 28).

Analysis of curriculum materials has taken many forms; each determined by the purpose of the analysis. Curriculum materials are evaluated for such things as their overall attractiveness, number of illustrations and graphs or readability. Recently, interest in assessing curriculum materials for a wide range of purposes has resulted in the development of several analytical tools. Examples of the focus of these analyses include assessment of curriculum materials for level of cognitive demand (Vacon & Haney, 1983), textbook questioning style (Leonard & Lowery, 1984; Lowery & Leonard, 1978), Canadian content (Orpwood & Souque, 1984), structure of explanations (Armbruster & Anderson, 1984), environmental education content (Nielson and Schroeder, 1984) , sexism and racism (Anderson & Tomkins, 1981).

General assessment analytical schemes have also been developed to

obtain a systematic overview of the components of the curricular material and enough consistency of this information to make comparisons between the assessments. These analytical schemes are organised sets "of questions and/or techniques designed for general application to given types of curriculum materials with the aim of elucidating and evaluating their most important characteristics" (Eraut et al., 1975, p. 32). Two examples of such schemes are the Sussex scheme (Eraut et al., 1975) and the Social Science Education Consortium (SSEC) (Knight et al., 1975). These are designed for descriptive-analytic functions, evaluative functions and/or decision-making functions. With these types of curricular material evaluation schemes it is recommended that the user become skilled in the application of the "tool" for each specific evaluative study (Worthen & Sanders, 1973).

The above priorities for curriculum analysis are taken primarily to aid decisions about specific aspects in the use, application or appropriateness of a curriculum material. Another aspect of curriculum material analysis has as its focus disclosure of meaning and extension of knowledge about the substance of the curriculum material. This provides a different type of information for regarding the use, application and/or appropriateness of the curricular material.

Curriculum criticism, as described previously, focuses on analysis of curriculum materials, attempting to make explicit those

values, beliefs, concepts and suggested experiences which are inherent

in the curricular material and are used to structure the student's

time and exposure to the content. Specific examples of analysis of

curriculum material which are considered to be curricular criticism

are Vallance's analysis of material for a course entitled _The Great_

Plains Experience (1977) and Munby's analysis of material for a course

called _Philosophy for Children_ (1979).

As described previously, Vallance's (1977) critique focused on

the curricular material as if it were an artist's work. Attempting to

describe the type of experiences it would "present" to children, it

described how the reader of the curriculum might experience its

content. This analysis serves as an example which aids in assessing

the appropriateness of various foci and methodologies for curricular

criticism. Vallance's work met with much criticism, focusing as it

did on the most unpredictable aspect of curriculum material: what

experiences will the material provide for students? (Werner, 1985)

Munby's (1979) critique focused on "every" aspect of the

curricular program, _Philosophy for Children_, which he felt was

relevant to assess what the program had to offer children, teachers,

and community. Aspects of the program which were discussed included

readability, consistencies (inconsistencies) between the authors'

rationale and the material's goals and activities, consistencies

(inconsistencies) between the authors' rationale and program placement

in curriculum, results of an ends-means program analysis,

implementation consideration for teachers, etc. Werner (1980) points
out that this "impressive (and broader) example of criticism ...
illustrates a number of purposes for curricular criticism". One of
the foci of the critique could have served as a critical question for
editorial criticism as described by Werner.

a. Editorial Criticism

Editorial criticism is presented as a possible focus and
methodological framework for curricular criticism of educational
programs. Werner (1981) states it is "an attempt to illuminate a work
by exploring the process of its creation, examining the sources and
perspectives available to the writer (or developer) in arranging the
parts to form a whole" (p. 144). Thus, the critic's focus is on the
author and the process of curriculum development.

The author is viewed as an editor, selecting aims, goals, subject
components, activities and forms of evaluation from a "universe of
possibilities". The result of these selections is a learning/teaching
document. The "pattern of design" inherent in the material reflects
the author's view of "appropriate" content, teacher role, student
role, environmental context, and so on. In other words, it reflects
in part the underlying values and presuppositions toward, for example,
knowledge, learning, and the subject matter.

The critic's task in editorial criticism is to make explicit
those values and presuppositions operating during the developmental

process. The desire is to make the implicit and null curricula explicit through an analysis of the rationale and design components of the material, as well as through descriptions of the social context in which the document was developed. More specifically, editorial criticism involves (1) stating a critical problem, of particular relevance to the curricular material, (2) gathering data related to the critical problem (from within the document and the social context), (3) validating the critique through documentation, relevancy, and/or a formal public dialogue. (A complete description of the methodology of editorial criticism is presented in Chapter 3.) The result of editorial criticism should be a description of the author's "meaning system" (operating during "curricular construction") as reflected in the design of the curriculum material.

As an "instrument" in assessing curriculum materials, Werner (1979) outlines three aims for this approach. (They may also be viewed as possible products.) (1) To expose the "underlying perspectives embodied" in the curriculum materials; (2) to reveal the "relationships between the document and its social context (those social ideals, situations, movements, etc. which might have influenced the development of the document); and (3) "to determine the possible implications" that these "perspectives" and "relationships" might have for classroom instruction. "A curriculum expresses what its authors think and what they want or assume others to think also" (Werner, 1979, p. 148).

Summary

In summary, the critical interpretation orientation to educational evaluation offers a means of discussing the underlying concepts of natural systems inherent in the "design" of the documents developed as introductions to ecosystem studies or investigations. With curricular criticism, the design of the curriculum material is viewed as reflective of the meaning system of the author. Editorial criticism provides a methodological framework for focusing on the critical "problem" (conceptualizations of natural systems) and elucidating the author's perspective during the development of the document.

Within the realm of curricular criticism, three tasks of the critic have been outlined: (1) selection of a focus for the critique; (2) selection of an "appropriate" methodology; and (3) incorporation of "public" dialogue in the validation of the critique. At this point in the critique of Sunship Earth, these tasks can be clarified and summarized as follows:

(1) selection of a focus for the critique

Generally, this task of the critic has resulted in the selection of two focal points: conceptalization of natural systems and the author of the curriculum material. For reasons outlined in Chapter 1, the first focal point arises from the desire to investigate the structuring of the conceptualization of natural systems by curriculum

materials. _Sunship Earth_ offers a unique approach to ecosystem study, focusing on sensory awareness _and_ the process of ecological conceptualization. This uniqueness resulted in the selection of the second focal point: comparing the author's intended ("unique") view of natural systems with his operationalized view.

(2) selection of an "appropriate" methodological framework

The framework chosen is editorial criticism. A general description of editorial criticism and the components involved make up the first section of Chapter 3. It is followed by a detailed description of the rationale and methods used to direct the critique of _Sunship Earth_.

The appropriateness of both the focal points and the methodology of the critique rests on the internal consistency of the critique and relevancy of the data gathered in terms of meeting the "aims" of editorial criticism outlined above. The third task of the critic (public dialogue) will aid in the assessment of this "appropriateness" or relevancy.

CHAPTER 3

Editorial Criticism: Methodology, Procedure and Design of Analysis

> Editorial criticism is... a description: judgement of
> the editorial perspective through which the documents
> are compiled from sources... The editorial critic
> teases out embedded assumptions and values within the
> materials to portray the author's editorial
> perspective. (Werner, 1981, pp. 144-145)

The purpose of Chapter 3 is twofold: (1) to outline the

methodology of editorial criticism described by Werner (1981) and

(2) to describe the design and specific procedures followed in the

critique of Van Matre's Sunship Earth (1979). Chapters 4, 5 and 6

make up the critique.

Methodology of Editorial Criticism Outlined by Werner (1981)

Werner (1981) outlines a general methodological framework for

editorial criticism, emphasizing that more specific structuring must

be tied to the curriculum material and the purpose of the critique.

The framework described consists of three processes: (1) selection of

a critical problem (question); (2) collection of "relevant" data (as

stipulated by the question); and (3) assessment of the process for

success in dealing with the critical problem.

(A) Selection of a Critical Problem

There are many possible questions that could be put to a curriculum material. Editorial criticism involves selection of a critical problem arising from an aspect of "dissonance" about the curricular material. This "dissonance" may be related to internal consistency and/or external "consistency" with other factors related to curriculum development. The critical problem, restated as a question(s), serves as the focal point of the critique.

(B) Collection of "Relevant" Data as Stipulated by the Critical Problem

The procedure for collection of relevant data is closely tied to the critical problem and curriculum material to be analyzed. General components include ascertaining the internal arrangement of the curricula and then careful analysis of it in terms of stated rationale, content, materials, resources and evaluation procedures.

Werner (1981) provides examples of "key" curricular components important for understanding the author's perspective during curriculum development:

> ... the critic shall underscore the terms, values,
> allusions, metaphors, and procedures pertinent to the
> critical problem in attempting to determine from what
> theory or other source those key elements are borrowed.
> (Werner, 1981, p. 150)

He also emphasizes the importance of paying attention to the social

context in which the document is compiled.

(C) **Assessment of the Critique for Success**

Werner (1980) outlines three "principles" of validation which can be used to judge the "rigor and value" of the critique:

1. The critic must make explicit the methodological framework and purpose of the critique. This aspect of validation is essential in that it sets out the presuppositions and biases of the critic.

   Critical work is always carried out against the background of the critic's own biases that color the selection and interpretation of data. (Werner, 1981, p. 151).

   The critic must focus on two questions in meeting the requirement of this validation: (1) "What is the purpose of the criticism?" and (2) "What methods are to be applied?".

2. A component of <u>public dialogue</u> (or public judgement) must be incorporated into the validation. The analysis of curricula is not a private task but rather is concerned with reciprocal understanding of the curricular material. Werner suggests two ways the

critique can incorporate public dialogue: (1) debate

openly the critical problem and/or framework, or

(2) validation by "other" people, for example the

developer or users of the program.

3. The validity of the criticism is also judged in its

"contribution to better understanding" of the

curriculum material (Werner, 1981, p. 151).

These general components serve as guidelines in structuring an

analysis to suit the curricular material and critical problem to be

investigated. The rest of this chapter outlines the specific design,

procedures, assessment and rationale which guided the critique of

Sunship Earth.

Methodology for the Editorial Critique of Sunship Earth

(A) Selection of a Critical Problem

The selection of a critical problem was conditioned by (1) a

personal interest in understanding the conceptualization of natural

systems offered by environmental programs and (2) the concern voiced

by environmentalists and environmental educators that societies' view

of the natural environment is neither "realistic" nor environmentally

sound. Chapter 1 briefly outlines the rationale setting this "domain"

within which the critical problem lies.

The factors which led to the subsequent selection of _Sunship_ _Earth_, and hence a restatement of the critical problem, are listed below:

a) The _Sunship Earth_ program is designed to promote conceptualization of natural systems using a combination of sensory awareness, ecological concept development, solitude and magic. This is Van Matre's first curricular program incorporating these ingredients of acclimatization.

In 1973, our Acclimatization group began toying with the idea of creating a special outdoor program for elementary schools, one that would be based upon the purposes and principles of _Acclimatization_ and _Acclimatizing_ (Van Matre, 1979, p. xv)

b) The acclimatization series focused on breaking "sensory barriers" and enhancing the development of individual natural awareness. The rationale of the _Sunship Earth_ program focused on development of individual self-awareness through development of natural awareness. This emphasized "opening doors" in the affective domain. In _Sunship Earth_ the conceptualization component of acclimatization "structured" the program through an approach Van Matre

terms IAA (Informing, Assimilating, Applying). This "structured" addition of ecological concept development coupled with the desire to construct an "effective" environmental education program resulted in the package Sunship Earth to which the following critical questions were addressed:

Had the conceptualization of natural systems, begun through the original acclimatization approach, been maintained/enhanced within the structure of Sunship Earth? (How does the author's intended view contrast/ compare to his operationalized view in Sunship Earth?)

How did the concept(s) of natural systems presented in the acclimatization approach and the Sunship Earth program compare/contrast to those described by environmentalists and environmental educators?

It is important, at this point, to emphasize the importance of the critical question (problem) in the development of the critique. As an "appropriate" critical problem it should serve as a "filter", screening decisions about research and analysis. It was the reference point for the development of this editorial critique.

<u>B. Collection of "Relevant" Data as Stipulated by the Critical Problem</u>

The collection of relevant data involved two phases: First, outlining the view of natural systems presented by environmentalists and environmental educators (from 1962 to 1979); and second, analyzing the curriculum material in terms of the critical questions stated above. The rest of this section outlines the procedures followed for these two tasks.

<u>1. Outlining the View of Natural Systems Presented by</u>
<u>Environmentalists and Environmental Educators</u>

<u>a. Rationale</u>

Outlining the concept(s) of natural systems described by environmentalists and environmental educators is meant to serve as a "backdrop" to Van Matre's intended and/or operationalized concept(s) of the natural environment. Acting as a "universe of possibilities" from which Van Matre (and his acclimatization group) compiled the materials, it should help to elucidate the concepts of the natural systems incorporated in the "pattern"/design of the curriculum materials.

Environmentalism and environmental education are chosen as the "backdrop" due to their impact in initiating and directing the development of Van Matre's three books: <u>Acclimatization</u>, <u>Acclimatizing</u>, and <u>Sunship Earth</u>. Their involvement is discussed by

Van Matre in the prologues and introductions of the books.

Reviewing the history of the camp nature programs, Van Matre (1972) sums up the "camping movement" as having "failed and failed miserably" (p. 8). His measure of failure is tied, in part, to the ecological crisis.

> Facing an ecological crisis, bombarded by the outpourings of the prophets of doom (who are probably all too correct) we attempted to convey ecological understandings by a greater dosage of that which had already proved demonstrably unenduring. (Van Matre, 1972, p. 9)

Such concerns initiated the search for a "meaningful" method for introducing people to natural systems. This was to replace the "traditional" identification -- collection -- experimentation and observation approach.

In all three books Van Matre also discusses his methodological concerns in terms of environmental education. He equates the field of environmental education to a "candy store"; "crowded, in a bewildering way, with an ever-growing number of choices" (Van Matre, 1979, p. xv). Searching through "stacks of environmental units and pouring over dozens of new projects" in preparation for structuring Sunship Earth, Van Matre states that his Acclimatization group concluded:

> Environmental education has undergone its own identity crisis. We are being inundated with vague, unfocused materials -- not real programs, but countless small projects.... In the end, none of the material we

> examined had quite the orientation we were seeking....
> So we decided to back up and start over, to construct
> our own picture of an effective environmental education
> program. (Van Matre, 1979, p. xvi)

The emphasis thus placed on environmental concerns and environmental

education during the structuring of the acclimatization approach and

of Sunship Earth made these two fields (environmental education and

environmentalism) the logical "social context" from which to view and

understand Van Matre's concept(s) of natural systems.

In developing this backdrop the descriptions of natural systems

presented by environmentalists and environmental educators were

compiled and summarized separately, although both cover the time

period of 1962 to 1979. This time parameter was determined by the

publication years of Van Matre's work: Acclimatization in 1972;

Acclimatizing in 1974 and Sunship Earth in 1979. The earlier time

period (from 1962, as opposed to 1979 for Sunship Earth) is included

for two reasons:

1. As stated previously one of the key components of

   Sunship Earth is the process of "acclimatizing". The

   rationale, principle and processes for this process is

   outlined extensively in Acclimatization (1972) and

   Acclimatizing (1974).

2. Environmentalism, "began" as a movement through major "awareness setting" publications such as <u>Silent Spring</u> (Carson) in 1962 and <u>The Population Bomb</u> (Ehrlich) in 1968. Further, the wave of environmentalism peaked between approximately 1968 and 1970. In order to summarize a view presented by environmentalists it seemed important to include the earlier time period -- overlapping with the formulation period of <u>Acclimatization</u> (1972) and of the initial, and most hetereogeneous wave of the environmentalist movement.

The techniques and procedures used for compiling the summaries for environmentalists and environmental educators differed. Therefore, the procedures and parameters used for delimiting the literature samples, and then analyzing and validating those samples are presented separately. The methods are outlined in the next two sections while the summaries are presented in Chapter 4, Appendix A and Appendix B.

b. Literature Review of Environmentalists' Concept(s) of the
Natural Environment

A general overview of environmentalists' comments about the
conceptualizations of natural systems (as related to environmental
problems) was compiled through the following procedures: delimitation
of a field of study; delineation of procedures to examine the
literature; and validation of the literature sample.

(i) Delimiting a "Field of Study"

The intention is to structure an "environmentalist's concept of
natural systems" based on a representative sample of the environmental
literature (from 1963 to 1979). Due to the hetereogeneity of the
environmentalist literature, the initial choice of references was
narrowed using the following criteria:

1. The published materials chosen were those considered to
be "popular" environmental books or articles. This
means they had an overall aim to generate public
awareness of man's environmental problems. Their
degree of "popularity" was assessed using the citation
index and review papers of the environmental movement.
The procedure for validation is described in the
following section (titled: Validation of Literature
Sample).

2. At some point the articles or text had to show a clear aim of discussing/describing the man-nature relationship and/or natural systems in an effort to formalize an understanding of the basis of environmental problems and ensure "appropriate" future actions.

3. Except for "review articles" or books focusing on the environmental movement, the material had to be published between 1962 and 1969.

(ii) Identifying the Literature Sample

The initial list of books/articles originated from the reading list of the Environmental Education Program at Simon Fraser University after they had been screened using the criteria outlined above (Delimiting a field of study). Addition to the list occurred through (1) cross reference by other articles or books already on the list, (2) inclusion as a reference in articles (books) reviewing the environmental movement, (3) recommendations by senior supervisor, and (4) "author" or title reference by Van Matre.[1]

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[1] Note that Van Matre does not include a bibliography in any of his publications. In the program description he makes reference to the following environmental or naturalist writers: B. Commoner, G. Hardin, R. Carson, J. Muir, A. Leopold, E. Seton and H. Thoreau.

(iii) Examining the Literature Sample

Initially, articles and books were reviewed (from the reading list) noting any comments, sections, etc. about man's view of natural systems and/or characteristics of the natural environment. These "comments" were then grouped into categories based on common emphasis of a particular aspect of natural systems.

Each category was individually placed on an index card. Each author's comments about or description of a category were then listed on the appropriate card. Continued reading and gathering of information did not suggest an increase in the number of categories. There appeared to be six characteristics related to natural systems described by environmentalists, based on the literature sample indicated in Appendix A.

1. The dualism of man and nature;

2. Illimitable (Open) Earth vs Finite (Closed) Earth;

3. The Reductionist (mechanistic) view vs holistic (systems) view;

4. A view of self-regulating properties of natural systems;

5. A view of optimum values in natural systems;

6. A view of complexity and stability in natural systems.

Under each category title in Appendix A are the authors who mentioned

and discussed that category or property of natural systems. Note that any one reference might be included in one or more category lists. Each author usually emphasized and discussed one or two aspects of natural systems in terms of environmental problems. Descriptions of the categories, as described by the references cited, make up the section titled "Concept of Natural Systems: Some General Characteristics Emphasized by Environmentalists" in Chapter 4.

(iv) Validating the Literature Sample

Two methods were used to assess how "representative" the literature sample was. First the Social Sciences Citation Index was used to provide some insight as to how "popular" the author and/or specific article/book was. Three five-year time frames were examined for the number of accumulated citations. Appendix B lists the references noted in Appendix A and indicates the number of times each item was cited over each five-year period.

The second method used to assess representativeness of the sample involved the use of articles reviewing the environmental movement. The review articles used are listed in Appendix B. Those books or articles which are included in the review are indicated by a check mark in the appropriate column. Although the review articles differed markedly in their focus and analysis of the environmental movement, there are several books and articles cited in almost every review (e.g. Boulding, 1966; Commoner, 1971; Editors of Ecologist (1974);

Ehrlich, 1968; Hardin, 1968; Meadows et al., 1972; and White, 1967).

The intention was only to "sample" the environmental literature enough to gain an overview of the environmentalists' general conceptualization of natural systems. A detailed literature search was not the intention -- although this study seems to outline a framework through which a detailed presentation could be pursued and constructed. The literature sample here includes several books and articles cited over 50 times (in a five-year period) and included in review articles analyzing the environmental movement. The sample is small, relative to the volumes of literature on environmental issues, etc. but the criteria delimiting the field eliminated many books, texts and articles which were "discipline" centered (e.g. Human Ecology, Human Geography, etc.) or were elaborating only on specific environmental issues.

(c) Procedure Used to Outline the Concept(s) of Natural Systems Presented by Environmental Educators

A general outline of the conceptualization of natural systems promoted by environmental educators is based on the information presented in Hart's doctoral thesis (1979); Environmental Education: Identification of Key Characteristics and a Design for Curriculum Organization. The reasons for choosing Hart's thesis are as follows:

1. Using document abstracts in CIJE and RIE, Hart scanned
    the literature for those articles describing
    environmental education. Covering the literature from
    1966 to 1978, he compiled a list of "key" elements
    viewed as characteristic of environmental education
    "programs".

2. Because of the "environmental" focus of environmental
    education, several of these "key" elements reflect how
    environmental educators view the conceptualization of
    natural systems. The nature of "compiling" procedure
    ensured that "key elements" are a consensus of a
    representative number of environmental educators.

3. Hart also focused on the conceptualization of these
    "key" characteristics. Based on the desire to
    "operationalize" these elements in the context of
    curricula, Hart chose to describe them in the framework
    of curriculum development outlined by Gibbons (1976).
    This organizational scheme addresses the concern of the
    inherently hierarchical nature of conceptualization.
    Thus the scheme outlined by Hart indicates which
    "elements" are enclosed by which elements, i.e. some
    are providing a context for the others. This is a

critical aspect of trying to summarize a conceptualiza-
tion of natural systems within an educational context.

In order to maintain the framework and inherent relationships of the
conceptualization outlined by Hart, the description of natural systems
is presented here within the curricular framework used in his thesis.
The curricular framework and discussion of "elements" reflecting
conceptualization of natural systems are presented in Chapter 4.

This approach to outlining the environmental educator's view of
natural systems also seemed appropriate when considering the purpose
of the summary. As a "backdrop" for analysis of an environmental
program, <u>Sunship Earth</u>, the framework allowed for direct comparisons
between the summary and the program.

2. Analysis Scheme for the Author's Intended View of Natural Systems

The following steps were involved in compiling and assimilating
the information necessary to outline Van Matre's intended view of
natural systems:

1. All three of Van Matre's books, <u>Acclimatization</u> (1972),
   <u>Acclimatizing</u> (1974) and <u>Sunship Earth</u> (1979), were
   used for the analysis. As explained previously, the
   first two books are included because they outline the
   rationale of the acclimatizing "process" which is an

integral part of the Sunship Earth program.

2. Explicit rationale statements made by the author which
    describe a view of natural systems were identified and
    listed for each book. The bulk of these statements
    come from the prologue, introductory chapter and/or
    earlier chapters outlining basic principles. These
    statements had to be descriptions of natural systems in
    terms of what the acclimatizing or Sunship Earth
    program hoped to accomplish. (The emphasis and focal
    point of the author's conceptualization of natural
    systems stated as components of the program(s)
    rationale.)

3. These statements were then categorized based on the
    rationale emphasis taken in Sunship Earth when
    discussing natural systems. This rationale emphasis is
    described in Chapter 5. Using this perspective the
    following categories were established and used to
    classify the descriptive statements:

    1. Descriptions of the "current" view of "a sense of
        place" (See Appendix C, Table 1).

    2. Descriptions of the "sense" in "a sense of place"

(see Appendix C, Table 2).

3. Descriptions of the "place" in "a sense of _place_"
   (see Appendix C, Table 3)

4. Phrases and terms describing the natural
   environment (see Appendix C, Table 4).

4. Adjectives, analogies, metaphors, etc. occurring as
   part of these explicit statements were subsequently
   listed in other tables as indicated in Chapter 5. This
   was to enhance the description of the intended view,
   validating connections with environmentalist and
   environmental educator descriptions being offered over
   the same time period.

3. Analysis Scheme for the Author's Operationalized View of Natural Systems

The following steps were involved in compiling and outlining Van Matre's operationalized view of natural systems as presented in the curriculum _Sunship Earth_ (1979) and associated materials (for example the passport and log books):

1. The curricular framework outlined by Hart (1979) was
   used to structure the description of the

operationalized view. This allowed for a more

realistic comparison between the components of the

curricular material and the emphasis of environmental

educators as summarized in Chapter 4.

2. The operationalized view was described by addressing

two questions:

What are the instructional elements of the _Sunship_

Earth program chosen to operationalize the intended

view?

(Materials and Methods, Roles and Relationships)

What are the contextual elements chosen to "set the

stage" allowing for the operationalization of the

intended view?

3. Each of the elements identified is described and then

discussed in terms of the author's intended view and

the view of natural systems of environmentalists and

environmental educators summarized in Chapter 4.

Assessment of the Critique for Success

Assessment of the critique for success occurs in Chapter 6 and involves consideration of the aims of editorial criticism (outlined in Chapter 2 under "Editorial Criticism") and the validation principles laid out by Werner (1980) (refer to Chapter 3, section titled "Assessment of the Critique for Success"). The aims and validation principles are restated as questions to the critique. These questions are then addressed to the extent it is possible within this form.

CHAPTER 4

Concepts of Natural Systems Described by Environmentalists and

Environmental Educators

The purpose of Chapter 4 is to present an overview of the

concepts of natural systems described/discussed by environmentalists

and environmental educators. An overview of the types of opinions

presented concerning the conceptual structuring of the natural

environment is outlined over the same time period Van Matre published

Acclimatization, Acclimatizing, and Sunship Earth. This is to provide

a "backdrop" for the analysis of Sunship Earth. The description has

been separated into three sections:

> Brief "historical" overview of environmentalism and
>
> environmental education;
>
> Concepts of natural systems described by
>
> environmentalists;
>
> Concepts of natural systems described by environmental
>
> educators.

Brief "Historical" Overview of Environmentalism and Environmental Education

Acclimatization (1972) was published during the peak period of

the environmental movement and approximately four years following the

appearance of the term "environmental education" in the literature. A

brief historical perspective is presented to establish the emphasis of

both "fields" and the carry-over of ideas from preceding "fields" of

related interest, in particular conservationism.

Conservationism

Conservation of natural resources, as a movement, began in the

late 19th century in opposition to the "exploitive" attitude of man[1]

toward nature. Natural resources, then viewed as inexhaustible, were

being utilized, exploited and, in many cases, "exterminated".

Rejecting this exploitive philosophy, conservationists attempted to

establish a new man-nature relationship (Stuhr, 1973; Swan, 1975).

Contributing to the articulation of this new relationship are the

works of such authors as Thoreau (1854) and Emerson (1836). Examples

of the romantic transcendalists, each wrote of the need to achieve an

"harmonious" relationship with nature through which a new "spiritual

awareness" of man's individual potentials could be seen (O'Riordan,

1980). Emphasizing that "man disrupts the fundamental harmony and

balance of nature", Marsh provided the fundamental structural focus

for the conservationists' movement in Man and Nature (1864).

By the 1900s a popular conservationist "sentiment" had arisen and

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[1] The word "man" is used as a generic term. It was used by
environmentalists and environmental educators during the time frame
reviewed (1968 to 1979) and it is similarly used by Van Matre and his
co-workers. The intent here is to maintain the social context in
which Van Matre's work began.

developed to the point of becoming a social movement. Internally this movement was heterogeneous, consisting of diverse social groups with "differing world views of social and ecological reality" (Schnaiberg, 1980). A hint of the heterogeneity is apparent when considering the two, differing (and in a functional sense opposing) views which developed within the context of the movement. One view "promoted aesthetic and ethical values ... attempting to focus on the man-nature relationship and the consequence of dissonance within this relationship" (Stuhr, 1973; Swan, 1975). The focus was one of habitat preservation, and within the conservationist movement, made up the preservationists movement. The second view advocated a "wise use" policy with the fundamental aim to develop natural resources for the public's economic interest. This conservation-efficiency movement was concerned more with sustenance than with the habitat focus of the preservationists (Schnaiberg, 1980). Both of these views contributed to the basis of the environmental movement. The preservationists view became integrated with the "efficiency" view within a broader range of ecosystem dimensions (global) to form the basis of environmentalism.

Environmentalism

Like the conservation movement, environmentalism was a social movement of incredible internal heterogeneity, in terms of differing world views and ecological reality. However, the fundamental concern of the "socioenvironmental relationships" sufficed to pull it together

as a major social unit (Devall, 1980; Sandback, 1980; Schnaiberg, 1980). The "habitat" and "sustenance" concerns of the conservationists were integrated over a global scale and the sustenance concern was frequently moved to a "survival fear" level (Schnaiberg, 1980).

This shift to "environmentalism" began following World War II with the rising scope and number of environmental problems. Two publications in particular had an impact on initiating the earlier stages of the movement: Aldo Leopold's Sand County Almanac (1949); and Rachel Carson's Silent Spring (1962). These books emphasize that "humankind [is] a part of the environment and that our welfare [is] at stake and hing[es] upon the welfare of all other things on earth" (Swan, 1975, p. 13). Leopold (1949) focused on the ethical basis of the environmental dilemma and advocated a new man to environment relationship or "land ethic". The "right of other forms of life" to continued existence was emphasized and stood in place of the economic and/or aesthetic reasoning of the conservationists. Carson's book emphasized a shift from an egocentric to an ecocentric view of natural systems. She focused on descriptions of the "web of life" and the importance of internal balancing mechanisms; "preached ecological sense and created a national storm" (Stuhr, 1973, p. 74).

Another early landmark event of the environmental movement is considered by many environmentalists to be Adlai Stevenson's "Spaceship Earth" speech to the United Nations (1965). Widely quoted,

he used a metaphor which became a "cornerstone" of the environmental movement: Spaceship Earth. "This metaphor, underlined by the first photograph of the earth from the moon on July 21, 1969, made the reality of finite earth, more and more apparent" (Swan, 1975, p. 14).

Reassessing man's place in natural systems and clarifying his/her dependence on ecosystem stability is a focal point of the environmental movement. Awareness of the connections and interdependencies between man and natural systems, especially in terms of man's survival as a species, initiated diverse considerations of a possible "new" man-nature ethic (proposed strongly by Leopold, 1949). The alternatives ranged from "paying attention to the ethical structure which is already in place" (Passmore, 1974) to dealing with an "epistemological" crisis requiring a major shift in man's ethical frame of reference (Bateson, 1979; Perelman, 1976; Shepard, 1969). The emphasis placed on this need to generate "new" environmentally "sound" attitudes and values focused attention on methods of generating an environmental consciousness. For many environmentalists it also focused on the importance of self-actualization and individual impact on environmental systems.

Environmental Education

> Unless we unpack, reshape and in some cases replace our
> cultural and psychological luggage, we will continue
> our self-defeating attempts to treat symptoms.
> (Miller, 1979, p. 459)

> Break through mankind's current "inner limits" which,
> even more than the outer limits of finite resources and
> environment, constrain our alternatives for the future.
> (Laszlo, 1978, p. xv)

Such concerns of the environmental movement stress the importance
of establishing a new type of education to focus on developing an
informed, environmentally concerned society.

Environmental education focuses on the man-environment (urban and
natural) interrelationships and interdependencies, and the skills,
values, information and attitudes necessary to ensure the interaction
which will promote man's survival as a species. Note the emphasis in
the following, often quoted, definition of environmental education:

> Environmental education is the process of recognizing
> values and clarifying concepts in order to develop
> skills and attitudes necessary to understand and
> appreciate the interrelatedness among man, his culture,
> and his biophysical surroundings. Environmental
> education entails practice in decision-making and self-
> formulation of a code of behavior about issues
> concerning environmental quality. (Cerovsky, 1971)

Inherent in the definition is the desire to develop values, skills,
and knowledge within each individual which will ensure the maintenance
of an environmental quality which supports man. Hart (1979) states:

> Environmental education does not ultimately have
> validity unless it involves educating to change the
> man-environment relationship for the better by
> acquiring an environmental ethic. (p. 16)

Hart further states that to acquire an environmental ethic requires
that each individual have both

> knowledge of the ecological basis of life, upon which
> judgements about the quality of the environment can be
> based, and an understanding of the socio-political
> institutions which regulate activities of people in
> relation to the physical world around them. (Hart,
> 1979, p. 16)

Thus, environmental education attempts to act on a primary focus of
environmentalism: development of a new man-nature relationship which
will support the survival of man as a species (at an appropriate
quality and level). Movement to this goal incorporates educational
movements of the past (e.g. nature study education; conservation
education and outdoor education (Swan, 1975)) as well as such
instructional elements as values clarification, problem-solving skills
and "systems thinking" (Hart, 1979).

Concept of Natural Systems: Some General Characteristics Emphasized
by Environmentalists

Introduction

During the 1960s and the early 1970s public and political
awareness of the terms ecology, environment and pollution grew with
increasing environmental problems; smog alerts in Los Angeles, "death"
of Lake Erie, radioactive fallout in populated areas, nitrate
contamination of drinking water (Commoner, 1972), acid rain (Miller,

1979) and pesticide contamination of ecosystem food webs (Carson, 1962), to name a few. Although historically, human alteration of the environment included many examples of complete ecosystem destruction, such factors as increasing population size, consumer demands and energy-requiring technology shifted this negative interaction in scale from an occasional, local environmental disaster to a mounting, global problem (Ehrlich, Ehrlich & Holdren, 1973; Miller, 1979).

Many different approaches are taken in discussions of the origin, consequences and possible solutions to environmental problems. In Silent Spring, for example, Rachel Carson (1962) describes the destruction of ecosystems through extensive use of pesticides and relates this to man's arrogant and domineering attitude toward nature. In "The Economies of the Coming Spaceship Earth", Boulding (1966) focuses on society's economic structure and outlines differences between the current exploitive, "cowboy" economy and the future, necessary "spaceman" economy. Alternatively, in "The Historical Roots of Our Ecological Crisis" White (1967) focuses on Christian "traditions" and their "part" in the establishment of society's exploitive and domineering attitude toward natural systems.

These examples of diversity in the focus and/or emphasis of discussions relating to environmental problems, is not so indicative of a lack of consensus as it is an indication of the multifaceted, multi-webbed character of the interaction within ecosystems and between man and his environment. This diversity is also indicative of

the different perspectives people bring to viewing the environmental

problems (and the environmental movement discussed previously). Leach

states: "'Man and nature' is ultimately a personal statement. It

will reflect the person's private concerns but in the conceptual frame

of his academic background" (Leach, 1967, p. 45).

As a group of concerned individuals, the core premise of

environmentalists is that humans are altering the natural systems upon

which all life on the planet depends. The current alterations,

ultimately threaten man's survival. "Human values and institutions

have set mankind on a collision course with the laws of nature."

(Ehrlich, Ehrlich & Holdren, 1973, p. 3). The description of these

values, institutions, laws of nature and the collision course vary

according to the emphasis of the environmentalist and his academic

background, hence, the heterogeneity of environmentalism.

Description of the Concept(s) of Natural Systems Presented by Environmentalists

> We are now in the middle of a long process of
> transition in the nature of the image which man has of
> himself and his environment. (Boulding, 1966, p. 3)

Based largely on ecological premises, environmentalists describe

several aspects of societies' view of natural systems which need to

change. Many of the basic social values, attitudes and information

comprising man's current view of natural systems clash with basic

ecological "principles". The suggested changes in components of our view of natural systems make up the rest of this section. The shift in perspective described here is believed by environmentalists to be a fundamental requirement of humans if individuals are to deal with the current environmental crisis. Some environmental groups feel that this shift in perception must be made at the individual level in terms of values, attitudes and ethics (Cahn, 1978; Laszlo, 1972; Peccei, 1981; Roszak, 1978).

Each item in the following list of "changes" is meant to represent an emphasis, or point of discussion, used by environmentalists in describing the environmental crisis. Each environmentalist tends to present one or more of these perspectives in his or her discussion. Taken together the items provide an overview of the "frontier" or "cowboy" view of natural systems as well as the "alternative" view of natural systems described by environmentalists. Because of the integrated nature of the topic, the items on this list are isolated from one another only by "degree" of focus. Elaboration of any one item will invariably draw in consideration of the other components in the list.

1. The dualism of man and nature;

2. Illimitable (open) Earth versus finite (closed) Earth;

3. The reductionist (mechanistic) view versus holistic (systems) view;

4. A view of self-regulating properties of natural
   systems;

5. A view of optimum values in natural systems;

6. A view of complexity and stability in natural systems.

The parameters of these categories must be viewed in terms of the
heterogeneity of the environmental movement. The desire here is to
summarize particular "issues" of discussion about ecosystems which
environmentalists tend to focus on when describing environmental
problems. This is to provide an indication of the conceptual
framework which environmentalists have of ecosystems and, hence, a
"universe of possibilities" backdrop for Van Matre's emphasis.

Each of these categories is described in terms of the general
emphasis taken by environmentalists focusing on it. Appendix A lists
the references referring to each category.

1. The dualism of Man and Nature

An environmentalist's description of the man-nature relationship
acts as a "core" presupposition in terms of how other aspects
interrelate in the conceptualization of natural systems. Although
this view has components which clearly distinguish it from the
"frontier" or "cowboy" view, a more detailed description of the
environmental view serves to reveal a key source of the heterogeneity
of the environmental movement.

The "frontier" or "cowboy" view (Boulding, 1966; Miller, 1984) of the biosphere is described as setting man apart and "above" natural systems. This illusion is felt to present man as having unlimited power over nature (provided he or she has sufficient information and appropriate technology). Man's role, in relation to natural systems, is described as one of conqueror and exploiter (Boulding, 1966; Hardin, 1961; Schumacher, 1973; White, 1967). Man is an "outside force"; nature's existence is for the sole service and needs of man (Benarde, 1970; Carson, 1962; The Ecologist, 1972; and White, 1967).

> Despite Copernicus , all the cosmos rotates around our
> little globe. Despite Darwin, we are not, in our
> hearts, part of the natural process. We are superior
> to nature, contemptuous of it, willing to use it for
> our slightest whim. (White, 1967, p. 23)

This extreme anthropocentric behaviour is viewed by many environmentalists as forming part of the foundation which has led to the environmental crisis. Man has "broken out of the circle of life" (Commoner, 1971). He or she had been "enticed into a nearly fatal illusion: that through our machines we [have] at last escaped from dependence on the natural environment" (Commoner, 1971, p. 11). Unaware of even his or her own needs as "an organism", man alters the natural environment; extracting resources, dumping wastes, synthesizing new chemicals, etc. Unknowing, he "foul[s] his own nest" in a very short order (White, 1967).

A transition in man's view of natural systems is a necessary aspect of setting the current man-nature relationship on a new basis. Environmentalists point out that modern man must learn to "experience himself as part of nature" and regain a sense of the global whole (Peccei, 1981; Schumacher, 1973). He must "close the circle of life" (Commoner, 1971). This shift is a prerequisite for achieving the ultimate goal of maintaining harmony within natural cycles. Many environmentalists stress further that a "consciousness of the species" must be evoked within each individual (Laszlo, 1972; Miller, 1984; Peccei, 1981; Roszak, 1978).

Environmentalists differ in their descriptions of what man's place (role) should be and how it should be attained. The role and impact of such factors as technology, population size, economy, religion and ethics, all enter the discussions with varying degrees of emphasis. Two "extremes" of these views of man's place "in" natural systems will be described through the use of two "environmental" metaphors: Spaceship Earth and Gaia. Both are used by environmentalists in an effort to help individuals relate to the context of the biosphere.

At this point description of the metaphors will focus only on how they perceive man's role in the man-nature relationship. Their usefulness in describing other aspects of environmental concepts of natural systems will be discussed in the appropriate sections which follow.

Metaphor: Spaceship Earth. The Spaceship Earth metaphor is the

favorite of the environmentalists (Chisholm, 1971; Tanner, 1974). The

concept has been credited variously to Adlai Stevenson (1958), Kenneth

Boulding (1966) and Buckminster Fuller (1970), although Boulding

states "I think we all invented it independently; it's an obvious

metaphor, and a nice one" (Chisholm, 1972, p. 29).

The basic components of this Spaceship Earth image are presented

in Adlai Stevenson's speech (1965) to the United Nations.

> We travel together, passengers in a little spaceship,
> dependent upon its vulnerable reserves of air and soil;
> all committed for our safety to its security and peace;
> preserved from annihilation only by the care, the work
> and I say, the love we give our fragile craft. We
> cannot maintain in half fortunate, half miserable, half
> confident, half despairing, half slave to the ancient
> enemies of man, half free in a liberation of resources
> undreamed of until this day. No craft, no crew can
> travel safely with such vast contradictions. On their
> resolution depends the survival of us all. (taken from
> Progress As If Survival Mattered, 1977, p. 11)

This metaphor maintains a degree of dualism in the man-nature

relationship. Emphasizing the importance of paying attention to our

actions and ensuring that the fragile, finite biosphere of Earth be

maintained, man is presented as "in control" as the passengers and

crews (astronauts). In Operating Manual for Spaceship Earth, an

analogy is developed between "spaceship earth" and an automobile which

presents an extreme view of the type of human technological control

"expected".

> One of the interesting things to me about our spaceship
> is that it is a mechanical vehicle, just as is an
> automobile. If you own an automobile, you realize that
> you must put oil and gas into it, and you must put
> water in the radiator.... You know that you're either
> going to have to keep the machine in good order or it's
> going to be in trouble and fail to function. We have
> not been seeing our Spaceship Earth as an integrally-
> designed machine which to be persistently successful
> must be comprehended and serviced in total. (Fuller,
> 1970, p. 47)

Some "schools" of environmentalism feel man must achieve complete

control over nature, as suggested by this "technological" metaphor.

Every natural function must be rigidly controlled in a programmed

existence (Miller, 1984, p. 486). The "tools" required to ensure the

proper functioning of the equipment include general systems theory

(Meadows, Meadow, Renders, & Behrens, 1972), topology, synergetics and

technology (computers) (Fuller, 1970). Environmentalists using the

metaphor in this sense emphasize that man must "seize the tiller of

the world" and "make our space vehicle a successful man operation"

(Fuller, 1970; Miller, 1984; Peccei, 1981).

Table 4-1 summarizes four review papers in terms of their view as

to the major "types", "profiles", "streams" or "perspectives" of the

environmental movement. O'Riordan's (1981) description would classify

this emphasis on technological control as an example of "technocentric

mode" in the environmentalists movement. Man can "profitably shape

his destiny" by applying "rational and value-free scientific and

managerial techniques to environmental problems" (O'Riordan, 1981, p.

1). If the "first priority" of this application is to sustain a

Table 4-1

Brief Outline of the Structural View of the Environmental Movement
Presented in the Review Papers of
O'Riordan (1981), Devall (1980), Sandback (1980) and Schnaiberg (1980)

References	Descriptive terms and phrases completing the statement The environmental movement consisted ...	Examples/ authors/references sited by the author of the review article
O'Riordan (1981)	... of two perspectives (or modes thought)	
	1. Ecocentric mode (ecocentrism): 'resting upon the supposition of a natural order in ... Terms: reverence, humility, responsibility and care; stability through ecological principles of diversity and homeostasis; natural morality leads to self-actualization; bioethics	Muir, Leopold, Shepard, Fraser-Darling, McHarg, Roszak, Schumacher
	2. Technocentric mode: - application of "rational" and "value-free" scientific and managerial techniques by a professional elite... regard natural environment as "neutral stuff". Terms: arrogant assumption man is supremely able to understand and control events to suit his purpose; managerial efficiency, optimism, rationality, technology	Meadows, et al. Professionals and administrators. "Efficiency" conservationism

Table 4-1 (Continued)

References	The environmental movement consisted ...	Examples/authors
Devall (1980)	... of two streams of environment-alism 1. <u>Deep ecology</u>: questions fundamental premises of domi-nant social paradigm; seeking new metaphysics, environmental ethic, epistemology... <u>Terms</u>: gestalt of person-in-nature; "ecological conscious-ness". Unity and wholeness/ integrity of person/planet plus biological equalitarian-ism; person is part of crea-tion -- on-going; lets being be; search for personhood linked to development of ecological consciousness.	A. Watts, F. Capra, J. Needham, T. Roszak, P. Sheperd, A. Leopold, E. Schumacher, G. Snyder
	2. <u>Reformists</u>: treats symptoms of environmental crisis, challenges some of the assumptions of dominant social paradigms but change society for better without attacking premises.	e.g. "back to land" movement, organic family ideology, zero population growth and limits to growth movement
Sandback (1980)	... of two main types of environmentalism: 1. <u>Ecological/scientific environmentalism</u>: sustaining a viable physical and biologi-cal environment is first priority -- any technological or economic changes are to be determined by this principle; scientifically argued - based on ecology and systems analysis.	<u>Blueprint for Survival</u> e.g. organic fertilizers, zero population growth, natural control of pests... Carson, Commoner, Meadows et al., Ehrlich

Table 4-1 (Continued)

References	The environmental movement consisted ...	Examples/authors
	Terms: return to "natural mechanisms"..., "holistic ecology; multi-disciplinary synthesis; computer modellers, systems analysis, technological decision, scientifically-sound.	
	2. **Anti-establishment environmentalism**: less concerned with environmental systems, more with whether or not science and technology are compatible with humanistic principles. Principal concern - man's alienation from society _and_ nature - product of science and technology. **Terms**: critical of technological society and science; seeks "spiritual revival that treats nature with respect"; transcendental ethic; yearning for mystical reunion with nature.	L. White T. Roszak
Schnaiberg (1980)	... of the following four participant profiles	e.g. stop littering
	1. **Cosmetologists**: Ecologically the main problem is viewed as getting rid of consumer waste products; To fix - get rid of the careless behavior	
	2. **Meliorists**: Ecologically the main problem is that consumer patterns are wasteful of resources; To fix - need new institutions for recycling products.	e.g. recycle products

Table 4-1 (Continued)

References	The environmental movement consisted ...	Examples/authors
	3. <u>Reformists</u>: Ecologically the main problem is that production expansion produces ecological problems: To fix ... reduce biosphere extraction rates through economic and political incentives.	
	4. <u>Radicals</u>: Ecologically the main problem is that "advanced industrial societies" inevitably exceed ecological limits. To fix - requires total socioeconomic restructuring for social welfare and environmental production.	

"viable physical and biological environment" through holistic, ecological principles, then Sandback (1980) would cite this as an example of ecological/scientific environmentalism. Both components of the environmental movement maintain the dualism of man and nature. Man is to be in control through the knowledge and application of science (especially ecology) and technology.

  Metaphor: Gaia. Gaia is not a widely used environmental metaphor, but it serves as an extreme opposite to the spaceship earth metaphor for considering the range of environmental views of the man-nature relationship. Gaia is the name given to the image of the earth as a "living personality". The Gaia hypothesis was developed by two environmental scientists, James Lovelock and Sidney Epton (1975):

> It appeared to us that the Earth's biosphere was able to control at least the temperature of the Earth's surface and the composition of the atmosphere...This led us to the formulation of the proposition that living matter, the air, the oceans, the land surfaces were parts of a giant system which were able to control temperature, the composition of the air and the sea, the pH of the soil and so on, so as to be optimum to exhibit the behaviour of a single organism, even a living creature. (Lovelock & Epton, 1975, p. 304)

  With the Gaia hypothesis, then, there is not a dualism of man and nature. "Nature is also us" and it is suggested that, "to have power over nature means the personhood of nature in our lives" will be gone (Roszak, 1978, pp. 47-49). It is through nature that individuals will

enjoy and understand their own morality and potential. The man-nature relationship is thus based on the premise of

> gestalt of person-in-nature. The person is not above or outside of nature. The person is part of creation on-going. The person cares for and about nature, shows reverence towards and respect for nonhuman nature, loves and lives with nonhuman nature, is a person in the "earth household" and "lets being be" (Devall, 1980, p. 303)

Thus the "oneness" of man and nature is emphasized along with the desire to co-exist with "non-human" nature in harmony and balance. "Let us make peace with Gaia on her own terms, and return to peaceful co-existence with our fellow creatures" (Lovelock & Epton, 1975, p. 305). The Gaia hypothesis is the metaphor of the "deep ecology" stream of environmentalism described by Devall (1980) (see Table 4-1). This movement questions the fundamental premises of the dominant social paradigm, seeking a transformation of values and social structure through liberation of "ecological consciousness". Development (liberation) of "ecological consciousness" is linked to self-actualization and the "search for personhood (Devall, 1980; Roszak, 1978).

This view of the man-nature relationship is also described by O'Riordan (1981) in his second perspective of environmentalism: the ecocentric mode (as opposed to the technocentric mode described for the spaceship earth metaphor). "Ecocentrism" rests on "the supposition of a natural order in which all things [move] according to

natural law, which a most delicate and perfect balance [is] maintained... Based on the teachings of the 'romantic transcendalists of the 1950s, man's potential and self awareness are viewed as gained through the "lessons of nature". A bioethic line of thought following from this ecocentric mode calls for fundamental epistological and ethical transformations in the man-nature relationship. It aims at achieving "unity" with nature.

Sandback's (1980) second type of environmentalism, anti-establishment environmentalism (as opposed to ecological/scientific environmentalism described above) also emphasizes the development of a "transcendental" ethic suggesting the desire for a "mystical reunion with nature" (see Table 4-1).

As metaphors the spaceship earth and Gaia hypothesis emphasize that man is part of the biosphere; an organism dependent on the maintenance of the earth's life-support systems. This environmental emphasis contrasts sharply with the alienated, exploitive "frontier view" of man and nature.

However the two metaphors also serve as sharp examples of extreme views of man-nature interaction described by environmentalists. The spaceship earth metaphor is a technological one, emphasizing man's ability to gain control, through science and technology, and guide the biosphere to "a harmonious balance which will support life". In contrast, the Gaia hypothesis emphasizes establishing a "oneness" or unity of person and planet with a code of behaviour which seeks

"permanence and stability based upon ecological principles of diversity and homeostasis" (O'Riordan, 1981, p. 1). The continuums presented by these views (e.g. technocentric to ecocentric modes of environmental thought (O'Riordan, 1981) and ecological/scientific environmentalism to anti-establishment environmentalism (Sandback, 1980) serve as guides in viewing the heterogeneity of environmentalism. The "position" taken on any of the continuums affects the incorporation of other components in the conceptualization of natural systems.

2. Illimitable (Open) Earth versus Finite (Closed) Earth

A second component of "man's" view of natural systems, appearing frequently in the discussion of environmental problems, has to do with "limits" (see Appendix A). The transition from a frontier to an environmental view involves the incorporation of the finiteness of the earth's resources.

Boulding (1966) describes this as a shift from an "Open Earth" view to a "Closed Earth" view. The earth's resources, including the air, land, minerals, water, fossil fuels, variety of species, and others are in limited supply. "Man" tends to fight perceived limits. The "limitless" attitude is reinforced by the "apparent immensity" of the earth and its resources compared to the size of man, his activities and the "power" of technology (Ehrlich & Ehrlich, 1970; Meadows, et al., 1972).

As seen from the moon, the earth has a finite size, and it is this finiteness (or closed earth) which is meant to be emphasized by the Spaceship Earth metaphor (Ehrlich & Ehrlich, 1970; The Ecologist, 1972; Schumacher, 1973). For all "closed" populations the availability of the physical necessities limits exponential growth. The "optimum" availability of the necessary resources to each individual, sets the carrying capacity of the ecosystem. Some environmentalists address these limits in terms of controlling population size (Ehrlich, 1968; Hardin, 1968) and/or improving resource management (Lorins, 1977; Meadows et al., 1972; Schumacher, 1972). Underlying each focus is the question of whether the earth's resources can support man's current consumptive expectations and his "freedom to the commons" (Hardin, 1966). "Our ignorance of the natural limits of the Earth's capacity to support us is colossal -- equalled only by our voracious appetite." (Peccei, 1981, p. 73)

Given that there are limits to the earth's resources concern focuses on the attitudes and values which reinforce use of the "commons" in a "limitless manner". Two obvious "frontier" attitudes which come under discussion are "bigger is better" and the expectation of "freedom to the commons". The former attitude advocates growth (e.g. industrial) and use of commodities; higher consumption indicating success and stability (Schumacher, 1973). "Freedom to the commons" results in attempts to maximize individual "growth" through maximum individual use of the commons without any responsibility to

its maintenance (Hardin, 1966). With a limited resource base, such attitudes toward the natural resources must be altered in the reconceptualization of natural systems. Environmentalists advocate incorporation of the "limited" availability of the "physical ecosystem necessities" to this reconceptualization. The means of incorporation is best discussed in terms of the "holistic" component of environmentalist's view of natural systems.

3. The Reductionist (Mechanistic) View Versus Holistic (System) View

Many environmentalists focus on the dichotomy of reductionism (specialists (Fuller, 1970); atomist (Laszlo, 1972); or mechanistic (Bohm, 1981) versus holism (comprehensive (Fuller, 1970); systems (Bernarde, 1970; Laszlo, 1972; Meadows et al., 1972)) in the restructuring of man's concept of natural systems. It is this aspect of environmentalism which overlaps with the anti-science movement of the 1960s, "both being connected with holistic and anti-mechanistic tendencies" (Sandback, 1970).

The narrowness of the reductionist perspective is viewed as a major component "fueling" the blind exploitation and destruction of ecosystems. With the loss of the ability to gain a "sense of the whole" man lost the ability to think appropriately about his(her) environment (Peccei, 1981). The following quote is taken from _Silent Spring_ in a chapter titled "And No Birds Sing". It serves as an example of what is viewed as a typical effect of the narrowness of the

reductionist perspective.

> The trees are sprayed in the spring... and often again
> in July... Powerful sprayers direct a stream of poison
> to all parts of the tallest trees, killing directly not
> only the target organisms, the bark beetle, but other
> insects, including pollinating species and predatory
> spiders and beetles. The poison forms a tenacious film
> over the leaves and bark. Rains do not wash it away.
> In the autumn the leaves fall to the ground, accumulate
> in sodden layers, and begin the slow process of
> becoming one with the soil. In this they are aided by
> the toil of the earthworms, who feed in the leaf
> litter, for elm leaves are among their favorite foods.
> In feeding on the leaves the worms also swallow the
> insecticide, accumulating and concentrating it in their
> bodies... In the spring the robins return to provide
> another link in the cycle. As few as 11 large
> earthworms can transfer a lethal dose of DDT to a
> robin. And 11 worms form a small part of a day's
> rations to a bird that eats 10 to 12 earthworms in as
> many minutes. (Carson, 1962, p. 101)

Angry not only at man's "single mindedness" or "shotgun approach"
but also his continual drive to conquer nature, Carson emphasizes the
interrelatedness of organisms as part of their community and within
their ecosystem. Inherent in her description of the effect of
pesticides on various ecosystems is her concept of the "web of life".
It is this "sense of wholeness" which environmentalists feel must be
regained in our view of natural systems. The "piecemeal" manner in
which we structure our information about environments provides a
distorted concept of natural systems.

Reductionism. From an atomistic or mechanistic ordering of reality then, knowledge about natural systems is compartmentalized into specialized units which do not "exist" in the context of natural systems (Laszlo, 1972). Reductionism (atomist view) arises, in part, from the methodology of science. Objectivity is a key component in the procedure of gathering data about "nature". Isolation is another component. The "item" is removed from its context to ensure control over all variables. Understanding results when the "parts" are combined to make the whole. Laszlo (1972) calls this the ancient "fallacy of reductionism", where scientists sought to "find the commonality underlying diversity in reference to shared substance". This desire resulted in what he describes as the "drilling of holes in the wall of mystery, that we call nature, on many locations" (Laszlo, 1972, p. 4). It provided an enormous amount of "rigorous" information about each "hole" but assumed that connections between the separate pieces could be computed in some "causal" relationship. Bohm describes this "mechanistic order" as structuring a world

> constituted of entities which are outside of each other, in the sense that they exist independently in different regions of space (and time) and interact through forces that do not bring about any changes in their essential natures. (Bohm, 1980, p. 173)

Thus, space and time are the predominant factors which determine the dependence or independence of different "entities", i.e. their

relationships. This piecemeal analysis of complex phenomena "does not give us a true mapping" (Laszlo, 1972, p. 13) of real things, since the focus is on detail and the components making up the overall context are ignored. The world is _not_ viewed as a complex process in terms of its cycles, spatial complexity, stability, diversity of organisms or variety of biochemical processes (Commoner, 1971).

Two presuppositions arise from this type of "ordering". The first is that if the individual parts are understood the functioning of the "whole" will be clear. The second is that the relationship between the process of thinking and the content of thought is one of independence. The former is sufficiently separate from the latter so that "clear, orderly, rational thinking can properly judge this content as correct or incorrect, rational or irrational, fragmentary or whole, etc." (Bohm, 1981, p. 18).

Wholism

> Wholeness is what is real... fragmentation is the response of this whole to man's action guided by illusory perception, which is shaped by fragmentary thought. (Bohm, 1981, p. 7)

Scientists and environmentalists are turning to a "systems", "holistic" or "nonfragmentary world view" which sees reality as one interconnected system (Battista, 1977; Bohm, 1981; Laszlo, 1972). Environmentalists refer to the harmony and balance of the "web of

life" and use other metaphors (e.g. spaceship earth and Gaia) which emphasize conceptualization of the whole. Properties not apparent when viewing the parts, are emphasized in popular "environmental statements", for example:

> Everything is connected to everything else.
> Everything must go somewhere.
> Nature knows best.
> There is no such thing as a free lunch.
>   (Commoner, 1971, p. 29, 36, 39, 41)

Information about natural systems is discussed by environmentalists in terms of ecological concepts: energy flow (food chains, food webs); biogeochemical cycles; diversity and stability, succession, etc. This is to shift the focus to a "complex system" view of the natural environment.

More theoretical approaches to "wholism" describe it as a perspective in which space and time are no longer the dominant factors in viewing "element" relationships. Matter and energy, space and time are to be viewed as transformations within the same "hierarchically ordered unity" (Battista, 1977; Laszlo, 1972). Laszlo (1972) describes this as a hierarchy of wholes where each whole is both a subsystem of many wholes and a part of the context for others. Bohm (1981) describes it as "something which is _not_ perceived in any one view, but...grasped only _implicitly_ as the single reality which is shown in all these views" (p. 8). Space, time and separate entities are viewed "abstracted as forms derived from a deeper "implicate"

order.   These "elements" are referred to as the explicite or unfolded

order...

> All matter is of this nature: that is, there is a
> universal flux that cannot be defined explicitly but
> which can be known only implicitly, as indicated by the
> explicitly definable forms and shapes, some stable and
> some unstable, that can be abstracted from the
> universal flux. (Bohm, 1981, p. 11)

The impacts of these two "paradigms" on the structuring of

concepts of natural systems differ.   To understand natural systems

within the reductionist view the phenomenon is objectively analyzed in

terms of "parts" and mechanical laws based on fundamental concerns of

mass, energy, space and time (Battista, 1977).   Entities of separate

existence show linear cause and effect relationships, based on

calculable "composition laws" (Kitchner, 1982).   The endless cycles

and interrelationships of natural systems are converted into

"man-made, linear events" and thus has man "broken out of the circle

of life" (Commoner, 1971).

Within the paradigm of viewing reality as one interconnected

system, analysis and understanding of the phenomenon arises from

interactive experiences between the observer and the observed.   This

interaction involves "both an inner experience and external

verification" (Battista, 1977).   Verification is obtained through the

use of modeling, focusing at the same order of complexity as the

phenomenon which is explained.   To grasp the properties of the whole

requires the use of such tools as general systems theory and
cybernetics (Battista, 1977; Fuller, 1970; Von Bertalanffy, 1968). It
is important to note that the reductionist view is encompassed by the
wholistic view, in that, this "modelling" does provide us with
information about reality. The concern is the extension of this model
or paradigm to inappropriate levels of complexity (Bateson, 1979;
Bohm, 1981).

Laszlo (1972) lists and describes four aspects of organization in
"integrated wholes" which serve as "repeating patterns" for all levels
of organization. These characteristics can serve as an outline for
viewing something at the "level of the whole". Laszlo's description
of these wholistic properties is useful in directing the emphasis of
conceptualization. They also overlap with the next three aspects of
an environmentalist's view of natural systems. Briefly, the four
"wholistic" properties of natural systems are described below:

1. "Natural systems are wholes with irreducible
    properties" (Laszlo, 1972, p. 27). This is the
    familiarly stated property of "wholes"; the whole is
    greater than the sum of its parts. Thus, the whole has
    defined, characteristic properties which, when viewing
    the separate "entities" may not exist.

2. "Natural systems maintain themselves in a changing
    environment" (Laszlo, 1972, p. 31). Natural systems do

not succumb to "entropy" (second law of thermodynamics). They are open systems able to maintain a _steady-state._ In other words the system shows homeostasis, defined as "the particular configuration of parts and relationships which is maintained in a self-maintaining and repairing system" (Laszlo, 1972, p. 37). This occurs when a "system" is a subsystem within a larger system defining an energy supply for its maintenance.

3. "Natural systems create themselves in response to the challenge of the environment" (Laszlo, 1972, p. 47). The emphasis here is that not only do natural systems show homeostasis, the system can also change, as seen in terms of movement from states of multiplicity and chaos to states of "oneness and order". Laszlo outlines "foreseeable characteristics of development":

    a. increase coordination of formerly relatively isolated entities
    b. emergence of more general patterns of order
    c. consolidation of individuals in superordinate organizations
    d. progressive refinement of certain types of functions and responses. (Laszlo, 1972, p. 52)

    Thus, new types of association in living systems which combine stability and complexity tend to be preserved.

This preserved association is new information to other entities of the system which accommodate to the change if it too ensures increased complexity and stability.

4. "Natural systems are coordinating interfaces in nature's hierarchy" (Laszlo, 1972, p. 54). The pattern of development described above results in levels of complexity organized as systems within systems; a continuous hierarchy. Development and differentiation (forms of information) are tied to the interfaces of these levels of hierarchy.

The next three items on the list (describing the environmentalist's concept of components of natural systems) arise from these "wholistic properties of natural systems". The discussion of the characteristics themselves are specific examples of the properties referred to in Laszlo's first statement: "Natural systems are wholes with irreducible properties" (Laszlo, 1972, p. 27).

4. A View of Self-regulating Properties of Natural Systems

One aspect of "regaining a sense of the whole" discussed by environmentalists (Peccei, 1981) involves altering man's view of the self-regulating properties of natural systems. The ability to maintain a steady state (homeostasis) is a characteristic which is shown at all levels of living systems (cellular to ecosystem level).

"Natural systems maintain themselves in a changing environment" (Laszlo, 1971, p. 31).

The "frontier" view of natural systems does not attend to the existence of these "balancing mechanisms" (Miller, 1984; Peccei, 1981; The Ecologist, 1972). Part of the problem here is that the "reductionist" approach tends not to focus on the interconnections and interwebbing amongst organisms and between them and their environment. It is this boundary area of interaction which constitutes the mechanism of homeostasis.

Also present is the anthropocentric assumption that man can ensure the functioning of the biosphere through external controls: technology. As a "frontier" view, this idea does not attend to natural "balancing" controls (Meadows, et al., 1977; The Ecologist, 1972). It is placed by some environmentalists in the "realm of pure fantasy" (Meadows, et al., 1977, p. 72), geared to the achievement of specific short-term targets regardless of the consequences (The Ecologist, 1972).

Of importance, then, is ensuring the proper functioning of the homeostatic mechanisms of the biosphere. Their essential structure must be respected and maintained (The Ecologist, 1972). Environmentalists point to several properties of these self-regulating mechanisms. They are automatic, maintaining environmental components at optimum values. Basic cybernetic models are used to describe these properties of the system (Fuller, 1970, Meadows et al., 1972; Odum,

1974; The Ecologist, 1972). Odum (1974) describes the maintenance of the "steady state" in "transient" developmental stages as involving both positive and negative "feedback". Homeostasis in the "mature" state involves the predominance of negative feedback loops, maintaining optimum values around "set points". Further, these homeostatic mechanisms "do not aim at satisfying a specific requirement, but at achieving a compromise between a whole set of often competing requirements: that which best satisfies the requirement of the environment as a whole" (The Ecologist, 1972, p. 74). Carson (1962) describes this as a "balancing" which occurs in a "time on the scale which is nature's... not the heedless and impetuous pace of man" (p. 17).

5. A View of Optimum Values in Natural Systems

Maintaining optimum values is a characteristic of self-regulating mechanisms. Editors of The Ecologist (1972) describe this as an essential principle of ecosystem organization: "There must be an optimum value to every variable in terms of which the system is described" (p. 73). Thus, for each variable there is a critical value around which the system may fluctuate. With each variable oscillating around its optimum value, the system has its "correct" structure. Positive feedback loops, moving the variable from the optimum level, if left unchecked, will eventually cause the system to break down.

Environmentalists point out that it is unknown how much we can

perturb these "limits" without serious consequences (Meadows, et al., 1972). Some feel we have already exceeded nature's capacity to bring the values back to optimum levels (Peccei, 1981). Ehrlich and Ehrlich (1970) state: "Nowhere is man's ecological naivete more evident than in his assumptions about the capacity of the atmosphere, soils, rivers and oceans to absorb pollution" (p. 160). It is man's treatment of the "commons" (free to all) components of the biosphere (soil, atmosphere, rivers and oceans) which clarify the degree of ignorance with which man acts toward optimum values.

Driven by the "growth ethic" the consequences of continually removing or adding materials to ecosystems are not considered. The emphasis on short-term gain and "freedom to the commons" masks the "optimum value" property of natural systems from immediate view.

6. A View of Complexity and Stability in Natural Systems

Another aspect of viewing natural systems as a whole involves the property of complexity, as related to ecosystem stability. This aspect of wholism is emphasized by some environmentalists, as a key feature of the ecosystem in terms of environmental problems. Basically, the greater the complexity of the ecosystem, the greater the stability, or resistance to change. All systems change or evolve to greater complexity. Within an ecosystem greater complexity is indicated by larger numbers of species within a community. This increases the number of trophic levels and lengthens the food chains.

In a complex system every ecological niche is filled: "every possible differentiated function for which there is a demand within the system is in fact fulfilled by a species that is specialized in fulfilling it" (The Ecologist, 1972, p. 75). This stabilizes the ecosystem. It is difficult for new species to enter and each species, forming part of the system, is unable to increase in number beyond an optimum value (related to niche availability). Ecosystems tend to increase in complexity in the process of evolution (Koslovsky, 1974) and succession (Odum, 1971). Thus they tend to change (biotically and abiotically) in the direction of increasing complexity and stability. As Laszlo (1972) stated: "Natural systems create themselves in response to the challenge of the environment" (p. 47).

This fundamental property of "living systems" is ignored in man's "frontier" view of natural systems. Lack of understanding has led to destruction of habitats and direct extinction of species. Even more disconcerting -- many of man's "positive" technological actions in the solution of environmental problems have further reduced ecosystem complexity (and hence, stability). Monoculturing of crops, the Green Revolution and intensive culturing of renewable resources are three examples (Bates, 1970; Ehrlich & Ehrlich, 1970; Peccei, 1981).

Environmentalists emphasize that, as part of a network, our connections to a "diverse" number of species, although not direct and clear, is critical to establishing the stability of our biosphere. Using the Gaia hypothesis, Roszak (1978) states:

One of the laws of systems control is that, if a system
is to maintain stability, it must possess adequate
variety of response... What is feared is that man-the-
farmer and man-the engineer are reducing the total
variety of response open to Gaia. (p. 39)

Summary of Environmentalists' View of Natural Systems

Environmentalists' conceptualization of natural systems arises

from the interrelation between three components: the "holistic"

characteristics and properties of natural systems; the limitations of

the biosphere; and the perceived relationship between man and natural

systems. The latter component is viewed within the context of the

former two components.

Generally, the holistic, non-mechanistic perspective of natural

systems is described using ecological principles and a system

conceptualization. Ecological principles articulate specifically the

"interrelatedness" of ecosystem components (both biotic and abiotic).

Focusing on the "connections", the concept of "a web of life" is

structured and clarified by descriptions of, for example, energy flow,

biogeochemical cycles, succession, community relationships (e.g.

competition, mutualism), diversity and adaptation.

Also emphasized are the dynamic characteristics which the "web of

life" shows as an "interrelated whole": for example, harmony,

balance, rhythm, stability, complexity and change. These

characteristics focus on the ability of living systems to self-

regulate (show homeostasis) as well as to undergo change and/or

development. Self-regulating "mechanisms" maintain environmental and

life components (or sets of components) close to "optimum" values (or combinations of values). This "regulation" results in an apparent "stability" of the system within the context of various oscillating environmental and life factors.

Changes of these systems are described in terms of the hierarchical levels of organization and degrees of complexity. Natural systems are increasingly complex in an hierarchical manner (as long as the changing system is a subsystem of a higher level with sufficient energy to "drive" the establishment of increased organization and interrelationships). As the complexity increases so does the resistance to continued change or development. At the ecosystem level this means that within a given habitat, increasing the diversity of organisms increases the complexity which, in turn, increases the stability of the ecosystem. All ecosystems show gradual succession to a species-diverse, climax community showing the greatest stability (within the limitations imposed by environmental factors).

All living systems operate within limits; there are combinations of optimum values for external (and internal) factors. This requirement is coupled with a diverse number of combinations of abiotic factors to which an equally diverse number of adaptations have been made. Such diversity tends to "hide" the absolute limits since each "adaptation" occupies a specific habitat which does not require (demand) the same combination of abiotic factors. Hence the greater the diversity (number of species) the less stress put on the limits of

any one habitat (and its combination of environmental factors).

Further, each new species occupies a new niche (if available)

increasing the interrelationship and "flow" of material through the

ecosystem. Finally, as limits are reached, specific organisms or

combinations of organisms are gradually replaced by another community

which has a different set of abiotic and biotic "limits" (succession).

Man tends to push biological systems in the opposite direction. He

reduces the diversity, making the ecosystem less stable and stressing

the usage of specific "abiotic" and "biotic" environmental factors

(adding or subtracting). This stress (e.g. exploitation) pushes the

system, in many cases, to exceed its limits and to collapse. Now the

limits, once passed, are realized.

Many environmentalists have chosen to emphasize these limits by

focusing on the "human species" and the "global biosphere", hence the

popularity of the spaceship earth metaphor. It conceptualized the

"isolation" of the planet and the imperative of acknowledging the

"limited" supply of many environmental factors which are "essential"

for living systems and/or socio-economic maintenance. Thus it placed

"man", as a living system, on a planet on which he (or she) might be

rapidly approaching his (her) abiotic and/or biotic limits.

To varying degrees the environmental books/articles discuss the

man-nature relationship in terms of both man's identity as a "living

system" and his/her responsibility and level of action needed to

maintain the natural balance (see Appendix A). The extreme

anthropocentric view of the "frontier" perspective formed the basis for an alienated, exploitive attitude toward nature. Man seemed unaware of his connections with living systems. Environmentalists emphasize that man's perspective of natural systems must be restructured from an ecocentric focus. The source of varying descriptions of a new man-nature interrelationship arises from the degree to which this ecocentric perspective structures the man-nature relationship.

The reviews of the environmental movement outlined in Table 4-1 provide more specific examples of the range of descriptions of "environmental" man-nature relationships outlined in this literature sample. A continuum can be constructed placing the views set by the Gaia and spaceship earth metaphors (refer to Figure 4-1). Both reviews of environmentalism as a social movement and summaries of environmental individual profile changes aid in clarifying placement along this continuum. This continuum is set by the ecocentric and technocentric modes of thought described by O'Riordan (1981).

O'Riordan (1981) describes environmentalism as consisting of two lines of thought which differ in "their attitudes to nature, as well as, in their morality that tempers action" (p. 1): the ecocentric mode and the technocentric mode. As indicated in Table 4-1, the ecocentric mode focuses on natural laws, limit(s) and principles to set the rules for man's behaviour (a natural "morality"). It presupposes a natural order and balance, maintained by natural law.

Focusing on the properties of the "web of life" the "code of behaviour" (based on bioethics[2]) is to seek "permanence and stability based upon ecological principles of diversity and homeostasis" (p. 1). Further, searching for this natural awareness and morality is viewed as a means to self- actualization in a "new spiritual awareness of his own potential, his obligations to others, and his responsibility to the life-supporting processes of his natural surrounding" (O'Riordan, 1981, p. 4).

Taken to extreme, "this natural morality displaces the humanistic morality that is intrinsically derived through man's cultural institutions" (p. 11). Devall (1980) refers to this extreme view as the "deep ecology" movement of environmentalism. Actively questioning the premises of the dominant social paradigm, this stream of environmentalism seeks a new "epistemology, environmental ethic and metaphysics". With the liberation of "ecological consciousness" man will fit into the "earth household", flowing with the systems of nature and achieving unity of person/planet. Gaia is the metaphor of the deep ecology movement.

The second (opposing) line of thought described by O'Riordan (1981) as a component of environmentalism is the technocentric mode. The proponents of this mode of thought hold that the application of "value-free" science and technology will allow man to "profitably shape his destiny". Nature is viewed as a "neutral stuff", which

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[2] Bioethics - Nature ... contains its own "purpose" which should be respected as a matter of ethical principle (O'Riordan, 1981, p. 5).

science is quite capable of managing. This mode of thought is
"arrogant in its assumption that man is supremely able to understand
and control events to suit his purpose" (O'Riordan, 1981, p. 1). The
technocentric mode is identifiable through its characteristics of
rationality, managerial efficiency, control, optimism and faith "in
the ability of man to understand and control physical, biological and
social processes for the benefit of present and future generations"
(O'Riordan, 1981, p. 11).

Sandback's (1980) description of the environmental movement
outlines two environmental types which clarify the possible impact of
the technocratic mode of thought in environmentalism: the ecological/
scientific and the anti-establishment. Ecological/scientific
environmentalism combines the ecocentric and the technocentric modes.
The maintenance of ecosystem stability is of first priority.
Guidelines for environmental policy are to arise from natural
balancing mechanisms; in particular, the ecological concepts of
stability, diversity and homeostasis. From this ecocentric emphasis
on attending to the limits and interconnectedness of nature", policy
decisions fall to ecologists using such "tools" as systems analysis,
cybernetics, decision theory and technology assessment (Sandback,
1980). The "means", then, are those of an objective, scientifically
based technology, carrying those characteristics described as
technocentric. The spaceship earth metaphor fits well with
ecological/scientific environmentalism.

Sandback's second type of environmentalism, anti-establishment, focuses primarily on the compatibility between science and humanistic principles. Technological and scientific methods are viewed as "agents of social control rather than liberation" (Sandback, 1980, p. 26). Science and technology contribute to the alienation of man from nature, "permitting" legitimate destruction of environmental components. Thus, as with the deep ecology movement, a fundamental change in the current social paradigm is desired. An alternative ethical framework seeks a "spiritual revival that treats nature with respect" and encourages a "mystical reunion with nature" (Sandback, 1980, p. 27).

Figure 4-1 illustrates that these various forms of environmentalism can be placed along a continuum depending on the balance of the ecocentric and technocentric modes of thought. The characteristics of the man-nature relationship shifts depending on their continuum location. The technocrat views nature as "neutral stuff" and scientifically, entirely knowable while the ecocentric mode views nature as the only medium of self-actualization and never entirely knowable. The former view seeks complete control over nature while the latter view seeks to live, in unity, as one, with natural systems.

This continuum can also be used to clarify the changes in individual views of the man-nature relationship as the movement progressed from the early 1960s to the early 1970s. Miller (1979)

Figure 4-1

Placement of Types of Environmentalism Along a Continuum
Between Ecocentric and Technocentric Modes of Thought

MODES OF
THOUGHT:

Ecocentric
(O'Riordan, 1981)
Nature:Source of
Self-actualization
Unity of person/planet
man cannot control

Technocentric
(O'Riordan 1981)
Nature:"neutral stuff"
man can know & control

<-------------------->

CONTINUUM

TYPES OF
ENVIRONMENTALISM:

Deep
Ecology
(Devall,
1980)

Anti-establishment
Environmentalism
(Sandback, 1980)

Ecological/
Scientific
Environmentalism
(Sandback, 1980)

METAPHORS:

GAIA

SPACESHIP EARTH

describes the characteristics of four levels of environmental
awareness and action observable as a wave of the ecological crisis:
pollution, overpopulation, spaceship earth and sustainable earth.
(These "levels" are also representative of the stages a single
individual might move through, upon becoming environmentally
concerned). During the first stage awareness of "pollution" occurs,
usually accompanied with the desire to "fix" these symptoms. The
second stage (overpopulation) occurs when the view of the ecological
crisis broadens, incorporating an understanding of the relationship
between levels of consumption, environmental impact, and population
size. The third level (spaceship earth) involves further broadening
of awareness to a global level, acknowledging that the earth has
"limits and that our life-support system is vulnerable" (Miller, 1981,
p. 486). Similar to the first two stages, the spaceship earth level
sees a dualism between man and nature. In this case man must strive
to achieve absolute control over natural processes in order to
maintain the "life-support system". The final awareness stage shows a
change in the man-nature dualism. The sustainable earth level
involves "selectively controlling relatively small parts of nature on
the basis of ecological understanding" (Miller, p. 487). But large
parts of the earth must be left in their natural state based on the
principles of "bioethics" and the feeling that the ecosystem is too
complex to be understood fully.

In terms of the continuum described in Figure 4-1, Miller's view

outlines a shift in the man-nature relationship from a predominantly technocentric mode toward a more ecocentric based approach. Such a shift is described as occurring with increasing environmental awareness, in particular the inclusion of a global perspective. Such a shift in individual perspectives is also described by Schnaiberg (1980) who also describes profile changes during the environmental movement. As summarized in Table 4-1 he sees four profiles showing "increasing awareness"; cosmetologists to meliorists to reformists to radicals. Similar to Miller's description the first three profiles focus on fixing the symptoms to ever increasing degrees while the final profile seeks radical changes in the dominant social paradigms.

That the environmental movement consists of heterogeneous sub-groups is apparent when considering the environmentalists view of natural systems. The diversity is illustrated by the ecocentric-technocentric continuum outlining "possible" views of the man-nature interrelationship. The position taken along the continuum affects the conceptualization and use of the basic ecological principles outlined more succinctly (showing less variation between environmentalists). However, the emphasis of one principle or level of hierarchy over another, combined with a specific stance on the nature of the man-environment interrelations casts the framework for the conceptualization of natural systems.

Concepts of Natural Systems: Some General Characteristics

Emphasized by Environmental Educators

Introduction

An overview of the conceptualization of natural systems described

by environmental educators is based on Hart's doctoral thesis (1979);

Environmental Education: Identification of Key Characteristics and A

Design for Curriculum Organization. The rationale for choosing this

material as the basis of the overview was summarized in Chapter 3.

Through a literature review Hart identified 26 key

characteristics of environmental education programs. Several of these

reflect a view of natural systems and are described briefly below.

The description follows the curricular framework used by Hart to

"operationalize" the elements in an educational context. This is to

maintain the heirarchical interrelationship between the elements

inherent in the framework. The framework is briefly described here to

facilitate the description of natural systems.

The curricular framework used by Hart is one outlined by Gibbons

(1976) with some alterations (Hart, 1979). Figure 4-2 presents the

curriculum elements as well as the key characteristics of

environmental education identified by Hart (1979). The curriculum

elements, designated educational program elements and program support

elements, are considered to be "dimensions or concepts in the

curriculum system" (Hart, 1979, p. 74). Thus, the figure

represents...

Figure 4-2:Environmental Education Characteristics:Curriculum Organizational Framework (Hart, 1979 p.85)

ENVIRONMENTAL EDUCATION

EDUCATIONAL PROGRAM ELEMENTS

Macrocurricular			Microcurricular	
Interdisciplinary	Multilevel	Global view	Awareness of understanding of basic concepts	Development of processes (cognitive/affective/skills)

EDUCATIONAL PROGRAM SUPPORT SYSTEM ELEMENTS

Instructional Elements — Roles & Relationships

Methods & Materials

Problem solving	Values clarifying	System thinking	Firsthand experiences	Environmental issues oriented	Present-future oriented	Active Participation	Individual learning	Team approach to teaching/learning	New productive student/teacher relationship

Contextual Elements

Learning Environment — Operating Condition

Community oriented	Field studies (urban and natural)	Communications networking	Coordination and cooperation

Organizational Elements

Flexible administrative organizational patterns	Reform of educational processes and systems

Research and Development Elements

Curriculum development base	Curriculum evaluation base	Research base	Professional development base

> a metasystem, in this case a curriculum system, which
> illustrates relationships among purposes (functions,
> domains, goals or objectives), organizing structures
> (macrocurricular), organizing elements (micro-
> curricular), and specific learning opportunities,
> activities and environments. (Hart, 1979, p. 84)

The environmental education characteristics are categorized under two

headings: (1) the educational program elements and (2) the program

support elements. The educational program elements are those

components through which the curriculum is conceptualized at various

levels of generality: macrocurricular or microcurricular. The

macrocurricular elements focus on "levels of generality

[organizational] ranging from the school program to considerations

which involve the entire school system" (Hart, 1979, p. 87). The

microcurricular elements include those organizational elements which

direct the structure of the learning environment (i.e. at the level of

lessons or units).

The educational program support elements make up the support

structure consisting of

> instructional, contextual, administrative and research
> and development processes [refer to Figure 4-1], each
> of which represents a major influence... determining
> whether the learning events will occur, how easy it
> will be to conduct them in a desired manner, and how
> successfully their goals and objectives will be
> achieved. (Hart, 1979, p. 97)

What follows is a description of those environmental education

characteristics (indicated in Figure 4-2) which provide some direct

insight into the conceptualization of natural systems by environmental educators. These elements are discussed only in terms of their possible impact on a "view of natural systems". (It is not intended as a description of the element -- This is summarized in Hart's thesis (1979).) The description follows the curricular framework outlined briefly above.

General Characteristics of Natural Systems Emphasized by Environmental Educators

1. Educational Program Elements

a. Macrocurricular Elements

The macrocurricular educational program elements are described as those which govern the structuring of curricular programs from the school program level to the "entire school system" (Hart, 1979). Of the three elements included at this level (refer to Figure 4-2), two are particularly relevant here: Interdisciplinary and Development of a Global or Integrated Environmental Ethic.

Interdisciplinary. Several interpretations of interdisciplinary are evident in the environmental education literature; from incorporation of environmental education into all disciplines to a complete restructuring of the current "disciplinary" units of knowledge (transdisciplinary) (Hart, 1979, p. 88). Of interest here

is the basis of these concerns about knowledge integration.

Some environmental educators point out that an interdisciplinary approach, standing as a key element at this curricular system level, emphasizes the need to unite the "compartmentalized" or "separateness" of knowledge disciplines (Hart, 1979). The compartmentalization of "discipline" information is seen as resulting in a fragmented view of man - environment interactions. It retards the ability to see the "wholeness" characteristics of natural systems.

An interdisciplinary aim is to focus on the environment as a whole first, and then to draw upon discipline information (methodology and knowledge). Each discipline has particular conceptualizations and/or methodologies which structure that "discipline's reality" and which used appropriately, aid in evaluation, assessment, and general understanding of natural environments.

Global view (Integrated Environmental Ethic). Both the interdisciplinary and the multilevel macrocurricular element (refer to Figure 4-2) serve to "set the stage" for the third macrocurricular characteristic: the global view or integrated environmental ethic. "This environmental education characteristic seems to be the one which provides the environmental rationale for all curricular decisions in environmental education" (Hart, 1969, p. 92). This characteristic arises from the explicit desire of environmental educators to equip individuals with the values, knowledge, skills and commitment which

ensure "appropriate" man-environment interaction (solving and

minimizing environmental problems) in relation to all ecosystems.

Such a global perspective would require specific abilities such as

"holistic thinking" and complex systems analysis. Holistic thinking

is defined by Perelman (1967) as

> the ability to recognize and deal with all the
> important components and feedback relationships of
> complex systems. This is an ability not only to think
> rationally about the interactions among the parts of a
> complex system, but to develop an intuitive feel for
> the dynamic behaviour of such a system as a whole.
> (Perelman, 1967, p. 41)

When coupled with complex systems analysis and the following

components, this will set the stage for a global perspective...

> understanding the causes and consequences of growth in
> a finite world; understanding the global process and
> its relation to human thought and action... understand-
> ing the basic concepts and fundamental processes of
> communication, control and learning... [and] defining
> long-term global goals and appropriate, effective means
> for pursuing them. (Hart, 1979, p. 92)

This global perspective is enclosed in the desire to "harmonize

necessary human activities with the dynamics and processes of earth's

ecosystems" (Hart, 1979, p. 92) and thus aims at development of an

integrated environmental ethic.

b. Microcurricular elements

Microcurricular elements are described as those "concepts, generalizing skills and values" which form the "threads of the curriculum" at the teaching-learning level (Hart, 1979). Both micro-curricular elements described by Hart (1979) provide information as to the view of natural systems "promoted" by environmental educators.:

Awareness and understanding of basic concepts
(ecological and environmental)
Development of processes (cognitive, affective and
skill behaviour)

Awareness and understanding of basic concepts. Two factors are significant in terms of how environmental education describes the means for development of basic environmental awareness and understanding. The first factor is a general advocation of "conceptualization" of the information, as opposed to a "discipline" content/mastery approach. Instead of working with discipline designated categories of reality the general consensus promotes "conceptualization" in order to "functionalize knowledge and understanding" and preserve "interrelationships that are obscured by compartmental distinctions" (McInnis, 1975, p. 14; Hart, 1979).

The second factor promoted for developing basic environmental awareness and understanding is the use of ecology as the "ultimate

source of underlying concepts in environmental education programs"
(Hart, 1979, p. 93). Most environmental educators, advocating
conceptualization, feel that ecological principles provide the
integrating themes for studying environmental "realities". Note,
however, conceptualization combined with "ecological concepts",
implies knowledge of ecological principles in a discipline-
compartmentalized fashion which will not suffice in developing an
understanding of environmental reality. Development of basic
conceptual understanding is intertwined with cognitive and affective
learning processes advocated by environmental educators, and described
in the next section, e.g. problem-solving, values clarification and
systems thinking. This combination of conceptualization and
ecological principles through designated thinking "processes" is
viewed as necessary to develop the ecological (holistic) thinking
required of a "global mind".

In terms of specific concepts "to know", environmental educators
have not formalized specific "unifying" concepts for all environmental
programs (Hart, 1979). Efforts at attempting to do so have resulted
in conceptual frameworks which are cumbersome and largely egocentric
as opposed to ecocentric (e.g. "Spaceship Earth" model of William
Stapp) (McInnis, 1975). McInnis (1975) presents one conceptual model
which tends to avoid these two shortcomings. Archibald compiled a
list of one-word concepts felt to be necessary to a basic vocabulary
of ecosystem dynamics. The seven basic concepts are: energy, food,

evolution, population, community, interaction and balance.

Two other examples of specific key concepts required to develop "ecological thinking" are stated here as further examples of specific ecosystem information on which environmental educators focus. McInnis (1975) outlines six conceptual areas through which cognitive understanding of the natural environment can develop: diversity, organization, interaction, continuity, change and limitation. Stapp (1975) lists several concepts, which "undergrid and support the philosophy of living in harmony with and within, our environment" (p. 58). Those directly related to conceptualization of natural systems, in terms of creating awareness and understanding, include:

Closed System

- Spaceship Earth is a limited life supporting system powered by the energy of the sun and energy made available through technological achievements (fission, fusion, etc.).
- Spaceship Earth contains essentially all the air, water, and land we will ever have. Land space and resources are limited and they are important contributors to societal wealth.
- Natural resources are distributed unevenly around the earth as well as within each nation.
- The natural cycles and systems of Spaceship Earth have limited capacity to recycle, disperse, or absorb natural and manufactured pollutants.
- Raw materials can be recycled in three ways: 1) reusing basic materials in the creation of a new product; 2) reusing an item for another purpose; or 3) reusing the product for its original purpose.

Biosphere
- The living and non-living parts of the biosphere are inseparable and interdependent.
- The biosphere is a complex system and extremely vulnerable to sudden or long-term disturbances.
- Within the biosphere energy is neither created nor destroyed. With each transfer of energy, some energy is lost (mainly as heat given off to the environment) and less is available for eventual consumptive uses.

Human Populations
- Human beings are an intricately interrelated part of the biosphere.

Environmental Ethic
- The central theme of an environmental ethic is an ecological conscience toward the environment that reflects a commitment of individual and group responsibility toward others and toward future generations -- an ethic where people are not irresponsible exploiters of the environment but complementary parts of the environment.
- An essential part of an environment ethic is a human ethic based on social justice for all individuals and groups. Such justice requires humanistic values (such as anti-racist, anti-sexist, and anti-poverty values).
- People who do not possess a human ethic are unlikely to practice a land ethic. There is a relationship between these two ethics and both are essential if people are to live harmoniously on Spaceship Earth.
- Only when each person and community acts in a responsible, ecologically conscious, and conscientious manner will we be able to live in harmony with, and within, our environment in both its human and natural components.

(Stapp, 1975, p. 58, 60)

Such conceptual models and concept lists emphasize the "systems and process" conceptualization of natural systems encouraged by environmental education. McInnis (1975) stresses that individuals must focus on the processes of the biosphere as opposed to, for example, only the absence or availability of specific resources.

Focusing on the processes (e.g. succession, biogeochemical cycles, seasonal rhythms, etc.) will enable students to deal with the "true" limitations or balancing (unbalancing) of the biosphere, as opposed to the simple removal or addition of a substance "X". Focusing on biological processes enables consideration of the "context" of substance "X".

Environmental educators promote conceptual understanding of basic ecological principles and processes. These, combined with the cognitive, affective and skill behaviour processes described next, are the generally accepted components for structuring the view of man-nature interaction and the view to natural systems.

Development of processes (cognitive, affective, skill-behaviour). The conceptual framework for natural systems is influenced as much by the process emphasis as by the ecological principles and conceptual emphasis described in the previous section. Attainment of an individual global (or integrated environmental ethic), described as the key macrocurricular element, requires involvement of the learner in the processes of each domain: cognitive, affective and psychomotor (or skill-behaviour). Environmental educators agree that the "affective processes (interests, attitudes and values) are inseparable from cognitive and psychomotor ... processes" (Hart, 1979, p. 95). The particular emphasis of one process over another varies with objectives and the views of the authors of curriculum programs and

materials. The specific processes noted as key elements for environmental education programs are listed in the following section as the "instructional elements".

With emphasis on process the concern arises for an "appropriate" sequencing to support overall conceptualization. Environmental educators generally feel the need for structural sequencing. Hart (1979) summarizes a "typical" sequence as follows: (1) experience a variety of environments; (2) abstract, conceptualize and synthesize the experiences based on knowledge and understanding. The sequence for environmental conceptualization is to emphasize the attitude development, promoting a "positive self-image and respect for other life forms and the natural environment" (Hart, 1979, p. 96). Consistent with the "ultimate" goal of the development of ecological thinking, process development should frame the type of interaction students will have in their environment.

> If the purpose of environmental education is to develop attitudes which motivate people to become involved with environmental problem solving, the emphasis must be placed on developing individuals who are capable of processing and integrating information, who are capable of continuously learning and thinking in systems models. (Hart, 1979, p. 97)

2. Educational Program Support System Elements

The educational program elements (macrocurricular and microcur-ricular elements) outlined above describe the "compiled" framework of

proposed environmental education curricula. This section focuses on the "support system elements" which, in essence, operationalize those program elements outlined in the previous section. Support system elements include instructional, contextual, administrative and research and development processes. Only those directly influencing the conceptualization of natural systems are considered here: the instructional elements and the contextual elements.

a. The instructional elements.

The instructional elements consist of those factors which the teacher uses to structure the learning environment. They have been separated into two categories: methods and materials and roles and relationships (refer to Figure 4-2).

Each category consists of those instructional elements (compiled from the environmental education literature) considered as essential components of an environmental education program. The elements listed under materials and methods are the following: 1. problem-solving, 2. values clarification, 3. systems thinking, 4. first-hand experience, 5. environmental issue and 6. present/future orientation. The elements of roles and relationships include active participation, individual learning, new student-teacher interactions and team approaches. These "characteristics" (or elements) are to operationalize the overall goal of environmental educators to develop individual awareness and concern for the environment (and associated

environmental problems) and the attitudes, skills, values and knowledge (e.g. conceptualization based on ecological principles) which ensure individual and group commitment to solution of environmental problems (present and future). Of interest here are those aspects of the characteristics which provide insight into the conceptualization of natural systems (promoted here by environmental educators).

Table 4-2 and 4-3 list the characteristics of "each element" as described by environmental educators (e.g. as indicated by Hart (1979)). Consider first the descriptions of the instructional elements in Table 4-2. Comparing the qualities of each element similarities appear between elements, as well as, with the macrocurricular and microcurricular elements described earlier. These "overall" similarities arise from qualities of specific "suggested" components of the learning environment. The focus here is any "trend(s)" in the proposed interactions between the student and "information" about natural systems.

Two trends stand out:

1. Dynamic participation by the learner is emphasized specifically by almost all elements: choosing, weighting alternatives, acting, evaluating (from problem-solving and values clarification), use of all senses (from first-hand experiences); involvement in

Table 4-2

Instructional Elements: List of Characteristics Outlined by Hart (1979)
for the Support Elements Included in Materials and Methods

Materials and Method Support Program Elements

Problem solving	Values clarification (from Raths et al. 1966)	Systems thinking	First hand experience	Orientation to Environ. issues	Orientation to Present/Future
Qualities involved:	Qualities involved:	Draws from:	Described as:	Involves:	Involves:

1. Define problem	1. Chosen
	  1) freely
	  2) from alternative
	  3) after consideration of alternatives
		1. Systems analysis - dealing with complex systems	1. Direct experience with natural systems	1. Environmental Issue	1. Thinking skills (Problem-solving; ecological)

2. Become informed	2. Prized
	  4) cherished
	  5) will affirm
		2. Ecological pattern of thought	2. Use of all senses in observation and/or investigation – raising the question to getting the answer e.g. sensory perceptual awareness to the environment	2. Problem-solving instructional method plus exercise: role playing simulation case study	2. Communication skills

3. Analyze alternatives	3. Action
	  6) with choice
	  7) repeat
		3. Intuitive feel for dynamic behaviour of whole			3. Consider alternatives

4. Choose most rational alternative					4. Self-awareness To promote – better images of potential future social and biophysical environment (not prescriptive)
5. Design plan of action					
6. Implement					

Table 4-2 (Continued)

Materials and Method Support Program Elements

Problem solving	Values clarification (from Raths et al. 1966)	Systems thinking	First hand experience	Orientation to Environ. issues	Orientation to Present/Future
Qualities involved:	Qualities involved:	Draws from:	Described as:	Involves:	Involves:
				To facilitate	
				- presentation of complex concepts	
				- interdisciplinary	
				- effect of time	
				- active participation	
				- problem solving	
				- operation of systems (natural and human)	

Table 4-3

Instructional Elements: List of Characteristics Outlined by Hart (1979)
for the Support Elements Included in Roles and Relationships

Roles and Relationship Support Program Elements

Active participation	Individual Learning (Independent study)	Team approach to teaching/learning	New productive student-teacher relationships
Description	Involves	Description	Description
- Based on environmental issues active	1. Diagnose individual differences	1. Team approach necessary for interdisciplinary/ problem solving program	1. student carries personal responsibility for learning
1. assumes personal responsibility	2. Produce individual learning programs	2. Teacher- facilitates independent study/create learning environment	2. teacher - creating learning environment
2. involved in decision-making, problem-solving and values clarification	3. Complements		3. group interaction important
	- active participation		
	- community and field studies		
3. active participant in environmental quality movement	- first-hand experience of problem-solving nature		

role playing, simulations, etc. (from orientation to

environmental issues); and, self-awareness (from

orientation to present/future).

2. Systems thinking is also reinforced by all other

elements: considering assumptions, alternatives,

perspectives, presuppositions, consequences (from

problem-solving and values clarification), ecological

pattern of thought; ecological thinking (from systems

thinking, orientation to environmental issues),

orientations to present/future), and tools of

investigation (problem solving; interdisciplinary,

operation of natural and human systems orientation to

environmental issues and orientation to present/

future).

Thus the desire is that the learner perceive and manipulate components

of natural systems, abstract and synthesize the experiences in terms

of "ecological thinking", consider alternative perspectives, compare

and communicate his or her perspectives toward environmental issues to

others, and act in solving environmental issues in the present and for

the future. Such "operational" descriptions of the learning

environment suggest the "natural systems" which they will study are

complex systems and will <u>not</u> be understood if treated in a

compartmentalized and alienated fashion. Not only is it <u>not</u> linear in

its arrangement of components but "complete" understanding of environ-
ment will require an "intuitive" feeling for the dynamics of the whole
(Perelman, 1976).

Table 4-3 lists the qualities of each element included in role
and relationship support system elements. The roles and relationships
outlined show a continuing emphasis on the learner to be a dynamic
participant, for example in choosing topics (from individual
learning), gathering experience and information (from individual
learning, team approaches and new productive student-teacher
relationships), making decisions (from all elements), working with
others (from all elements) and acting for environmental quality (from
active participation). These elemental qualities also support the
learner in operating within a conceptual framework which is dynamic,
open to re-evaluation, new experiences and different perspectives of
"knowing".

b. Contextual elements.

The contextual program support elements focus on aspects of the
"overall" learning environment, related more to the situational
context of the "lesson". The contextual elements (refer to Figure
4-2) described are grouped under learning environments and operating
conditions (refer to Figure 4-2).

Learning environment includes two elements: community oriented
elements and field studies (urban and natural environment). Of

concern is the establishment of an appropriate environment, consistent with the learning needs. Community orientation and field studies describe the extensiveness of "learning environments envisioned outside the classroom". Both encourage use of first-hand, investigation interacting with alternative learning environments (natural and community). In terms of natural systems, environmental educators feel that first-hand "field" experience within ecosystems will promote perceptual awareness and subsequent conceptual, cognitive understanding. "People must be reunited, must 'identify' with the natural environment if they are to recognize its inherent value" (Hart, 1979, p. 117).

Operating conditions includes two elements: communications networking and coordination and cooperation. These elements emphasize that the experiences and conceptual understanding gained by the individual about his natural environment must be communicable (by him or her) as well as "transcend" national boundaries and operate globally.

Summary: Environmental Educators View of Natural System - An Overview

The key characteristics of environmental education, identified and described by Hart (1979) are presented in a curriculum development organizational scheme. Several of these characteristics as well as their place in the curricular framework, aid in conceptualizing how environmental educators view natural systems.

The emphasis on the development of a global view, or integrated environmental ethic, focuses on the "wholistic" properties of natural systems and the processes which maintain and change ecosystems. Discipline-compartmentalized information is believed not to be representative of environmental systems or problems. Similar to the environmentalist's emphasis ecological principles and processes are the "core" information outlined for understanding and conceptualizing ecosystem dynamics. However, it is stressed that those principles must be part of a conceptual framework structured using such processes as values clarification, systems thinking and problem solving. Thus the view of natural systems presented is one of complex systems and dynamics. In order to fully comprehend these factors of natural systems the learner must be exposed directly to the natural environment and deal with it through all affective, cognitive and psychomotor means (processes).

The ultimate goal -- development of an integrated environmental ethic, also emphasizes that man has a role in maintaining his/her life-support system (the biosphere). The overall emphasis is on clarifying man's connections in the "web of life" and understanding the importance and significance of maintaining environmental quality. A key component then is development of an ecological conscience in the framework of "holistic" thinking and complex systems analysis.

Final Considerations About the Environmental and Environmental

Education Summaries

It is important, at this point, to restate the reason for these summaries of environmentalists' and environmental educators' views. Each presents an overview of the conceptualization of natural systems discussed and described by its particular social group (between 1962 and 1978). The summaries are meant to serve as a "backdrop" for the discussion of Van Matre's intended and operationalized view of natural systems presented in Sunship Earth. The summaries are not based on an exhaustive literature review. Note also that the descriptions of the components of the conceptualized views (e.g. wholeness, hierarchical organization, systems analysis, homeostasis) are not extensively elaborated. Once a general overview of components had been identified, movement to the analysis of Sunship Earth occurred. It was felt the analysis would indicate areas requiring further investigation.

CHAPTER 5

Van Matre's Intended and Operationalized View of

Natural Systems

This chapter outlines and describes Van Matre's intended and operationalized view of natural systems presented in Sunship Earth (1979). The chapter begins with an outline of the overall format of the program. Then the intended and operationalized concept(s) of natural systems are described and discussed. These descriptions are based on (1) an analysis of the curriculum material, (2) statements from earlier publications, Acclimatizing (1974) and Acclimatization (1972), and (3) the view of natural systems presented by environmental educators and environmentalists from 1962 to 1979 (summarized in Chapter 4). The source of each component of the description is cited in the body of the description.

Format of the Sunship Earth Program

The Sunship Earth program is a five day residential experience designed to promote a sensory and ecological conceptual understanding of natural systems (for Grades 5 and 6). A key aim of the program is to aid students' conceptualization of "their place in space and/or the universe". To facilitate this aim and to structure the program, the author(s) chose to envisage the residential campus as a Sunship Study Station. Students arrive for a "retraining" program to learn how the

sunship (earth) operates in order to be "better passengers and crew".

Two weeks prior to their arrival at the Sunship Study Station, students apply for official passports. These passports "allow" student entry into the learning stations making up the "concept paths". They also act as "notebooks" throughout the program. The passport contains the ecological statements they are to learn, space for them to draw and to explain their own example of each concept and for noting their "unsound" "environmental habits". Once the students demonstrate they understand the concept presented, the appropriate passport page is stamped with the concept name.

Upon arrival at the site students are introduced to the staff and teachers and are oriented to the grounds and basic living procedures. Following this the "Welcome Aboard" meeting occurs. The emphasis is to present the theme of the program: the earth is like a spaceship but powered by the energy of the sun (hence Sunship) and the students must learn how it operates to become better passengers and crew. This orientation to the planet and the purpose of the Sunship Study Station is followed by an acclimatization walk: "Touch the Earth". The walk is structured to break sensory barriers and stress sensory involvement with the natural environment.

Finally the students are given a "log" book (to be used to record "discoveries" and thoughts during the week) and are introduced to their "magic spots". The "magic spot" is a time and place (in natural surroundings) where each student sits alone. He or she is encouraged

to relax and reflect in this setting. Various techniques of natural observation are outlined in the log book to help them through this time. The students return to their magic spot at specified times each day.

During the first three mornings, students move through one of the three concept paths. There are seven ecological concepts (energy flow, cycles, diversity, community, interrelationships, change and adaptation: EC-DC-IC-A) which are studied at the learning stations along each path. The format for each station follows an IAA (informing, assimilating, applying) sequence. One member of the "crew" reads the passport concept statement (informing). Then the activity (including props. games and role playing) enables concept assimilation. Application involves searching the surrounding area for an example of the concept and entering (drawing) this into their passport. Once all the "crew" members are finished, the passports are stamped and they move on to the next station.

In the afternoons and evenings the activities vary but include an "Immersing Experience: (designed specifically to alter sensory perception and break sensory barriers) and either a "Discovery Party" (designed to enhance sensory perception) or "Interpretation Encounter" (designed to synthesize and ask for application of the seven concepts presented in the concept paths).

All other activities, including walking between learning stations, meals, Time Out, Workshops, or decorating the cabin are

structured by special criteria. The activities must encourage contact with the elements and enhance skill development compatible with the Sunship Earth theme. The desire is a "total immersion" experience at the Sunship Study Station. Van Matre (1979) states that "youngsters learn the patterns they live" (p. 38). Therefore the acclimatization group attempts to structure the "entire" experience in terms of the role of passengers and crew on Sunship Earth.

The final events of the program include "Journey Home", "Model Planets", "Passengers Guide" and a "Closing Ceremony". Each contributes to synthesis of the ecological concepts and application of this understanding by acknowledging environmental "bad habits". Each member is to accept "passenger responsibility" and move toward "action" in an "environmentally sound" manner. This is to ensure the survival of the biosphere.

Author's Intended View of Natural Systems

A. Introduction

The method used to compile an "intended" view of natural systems (from the rationale and introductory statements) is outlined and explained in Chapter 3. Direct quotes from Sunship Earth (1979), Acclimatizing (1974) and Acclimatization (1972), describing natural systems, are categorized and listed in Appendix C, Tables 1 to 4. Criteria for the classification of these quotes were established based on the rationale emphasis of Sunship Earth. The same criteria were

then used to classify the quotes from <u>Acclimatizing</u> and

<u>Acclimatization</u>.

B. Rationale Emphasis in Sunship Earth

Development of the <u>Sunship Earth</u> program framework involved

repeated consideration of four "Big Picture" questions: how does all

life on this planet function; who lives here; how do living things

work together; and, where are we (Van Matre, 1979, p. 12). The

central theme of the program which arose from discussions of these

questions focused on the last of them and was restated to become "our

place in space"...

> ... like a surveyor, we wanted to cast a point of
> reference for each of our learners -- to convey
> something about their place in the universe (Van Matre,
> 1979, p. xvi).

Developing a "sense of place in space" is described as possible only

through establishment of "personalized" connections with natural

systems. Definitions and descriptions of the two terms acclimatizing

and acclimatization clarify this emphasis and requirement.

Each of Van Matre's books defines and describes the terms

acclimatizing and acclimatization. To acclimate means that the

individual is becoming accustomed to a new environment.

Acclimatization, as presented in the first book, focuses on equipping

the individual with sensory "frames" necessary to understand the

ecological concepts (of natural systems). Acclimatizing is viewed as the continuing life-long "process of personally relating to the natural environment" (Van Matre, 1974, p. 13). Defined in Sunship Earth :

> Where we're coming from
> ACCLIMATIZATION ... (1) To feel at home with the natural world. (2) To be aware of the ecological processes which govern life and to understand one's role as a part of those processes. (3) To increase both sensory awareness and conceptual understanding of the natural world.
>
> As an educational program
> ACCLIMATIZATION is ...
> a program which helps people of all ages build a sense of relationship -- through both feelings and understanding -- with the natural world.
> (Van Matre, 1979, p. 5)

Both of these statements emphasize that acclimatization is concerned with establishing a "particular" type of association between the individual and the natural world. It is meant to "familiarize, sensitize, naturalize, harmonize" (Van Matre, 1972, p. 18). Further descriptions (definitions) occur throughout the books illustrating Van Matre's statement: "...[the] concept of ACC is illusive; it does not lend itself to dictionary precision" (Van Matre, 1972, p. 73). A few quotes specifically aimed at "describing" acclimatization and acclimatizing will suffice to touch on the scope of Van Matre concern.

Acclimatization is...

> a breaking down of the barriers to the point where one
> human being can feel himself not only completely
> surrounded by his environment, but totally involved
> with it as well....unity with nature
> (Van Matre, 1972, p. 17)

> ... more a state of mind than a list of prescriptions.
> It's attitudinal rather than dogmatic.
> (Van Matre, 1972, p. 21)

> ... not a thing, but a process. We believe
> comprehension of life's web by permeation, not per-
> ambulation.
> (Van Matre, 1972, p. 72)

> ... a certain type of mind-set
> (Van Matre, 1974, p. 14)

> ... living poetry. It deals with the rhythms of life
> itself.

> Acclimatizing is...living beautifully.
> (Van Matre, 1974, p. 14)

> Natural awareness is THAT -- the natural world.
> Acclimatizing is US IN THAT.
> (Van Matre, 1974, p. 17)

Thus the main thrust of the program focuses on establishing an

"association" between the individual and the natural environment, but

more precisely, this "association" is to incorporate a "mind/body",

sensory/concept type of understanding or "knowing".

> To become one with the natural world is not just to see
> the wholeness. It is to BE, to recognize one's place
> in that whole... to stand as a brother with the stones
> and trees.
> (Van Matre, 1974, p. 167)

The strength and preoccupation of this view in developing the Sunship Earth program suggested it should be a focal point in clarifying the author's intended view of the natural environment. Using this personalized man-nature "association" as a focal point, categories were established for classifying all quotes cited as descriptive of a view of natural systems. "A sense of place in the universe" became the crux of the classification system. Quotes were categorized based on which aspect of this statement they clarified:

> Descriptions of the "current" view of "a sense of place"
> (see Table 1 in Appendix C)
>
> Descriptions of the "sense" in "a sense of place"
> (see Table 2 in Appendix C)
>
> Descriptions of the "place" in "a sense of place"
> (see Table 3 in Appendix C)

A final category was established for all terms, phrases, sentences, etc. which were used specifically to describe the natural environment.

> Phrases and terms describing the natural environment
> (see Table 4 in Appendix C)

All quotes from Acclimatization 72, Acclimatizing 74 and Sunship Earth 79 describing the natural environment could be placed in one of these categories.

C. Author's Intended View of Natural Systems

As indicated by the classification scheme (used in Appendix C) two stages are involved in this description: elucidation of the "sense of place" as described by Van Matre and a description of natural systems. Both are considered against the "backdrop" of environmentalism and environmental education (outlined in Chapter 4).

1. The "Sense of Place"

Clarification of Van Matre's core phrase a "sense of place", involves examining his comments on the "current" lack of "a sense of place", as well as quotes specifically describing the statement. Van Matre's comments regarding society's current association with natural systems are listed in Appendix C, Table 1. His statements emphasize the existence of an alienated and destructive man-nature association. For example...

from Acclimatization (1972)

> The new approach [Acclimatization] is based on explicit
> assumptions about modern man and his offspring: man
> has cut himself off from nature... He watches it
> [nature] but keeps himself separate from it. He is
> viewer rather than participant... he cannot really
> understand his natural surroundings. (p. 17)

from _Acclimatizing_ (1974)

> ... fate we appear to pursue with some diligence ...
> [we've] become anesthetized rather than sensitized to
> our surroundings; and isolate ourselves from our
> natural origins. (p. 12)

> Man may well be doomed as a viable species unless he
> can awaken his natural voices and his capacity to
> genuinely listen to the voices of nature. (p. 19)

from _Sunship Earth_ (1979)

> ... and thus [we] have lost the understanding of and
> feelings for ... the natural processes upon which we
> ultimately depend ... a distorted perception... [we]
> view green contours... as ancient shadows without
> substance or meaning, without value to our future. (p.
> xviii)

Table 5-1 lists the descriptive terms and phrases used to refer to

society's "current" view of the man-nature association. They have

been compiled from the statements in Appendix C, Table 1.

Similar to the "frontier" view described by environmentalists and

environmental educators, Van Matre outlines a detachment, or

alienation, of man from nature. He associates this with

"MIS-conceptions" ("distorted") perceptions of the natural

environment, as well as with the "manifestation of intensive

destructive capabilities". Van Matre's terms, phrases and thrust of

statement reflect those of the environmentalists attempting to awaken

the public to the environmental problems. Note in Appendix A the key

Table 5-1

Descriptive Terms and Phrases Used by Van Matre to Describe
Society's Current View of "Our Sense of Place" in Natural Systems

Reference	Terms and Phrases	
Acclimatization (1972)	groped tore mutilate tramp fear of	cut himself off from separate from viewer rather than participant cannot understand ... surroundings comfortably detached relationship obsessive urge to plunder
Acclimatizing (1974)	self-consumptive approach incessant destruction destroy malaise upon the land intensive destructive capabilities pit your energies against nature anesthetized isolated ourselves artificial detachment unhealthy duality broken away from so abruptly doomed as viable species mutilate against natural awareness imperilled	
Sunship Earth (1979)	textbook concepts little direct impact isolation have lost sight distorted perception view ... without meaning ... value pragmatic warnings concepts formed ... by cultural milieu MIS-conception senses are dumped ... one homogenized mass not trust own perception be objective disregard emotion and feelings experiment to find truth omnipotent conqueror omniscient steward taken for granted	

terms used (by the environmental reference cited) to describe man's

frontier attitude toward nature. The terminology (ranging from

arrogant, exploiter, separate, fragmented view to anthropocentric)

coincides with the emphasis of Van Matre's statements describing the

man-nature interrelationship.

Blindly has man become perceptually and emotionally isolated from

the natural environment. Misguided attitudes and values (see Appendix

A) perpetuate this alienation. Thus, for example, Van Matre states

man must _not_ ...

> ... view natural resources as individual things rather
> than communities (1974, p. 10)
>
> ... believe that the thing named "becomes what we have
> named it" (1974, p. 12; 1979, p. 29)
>
> ... take life apart and care "nothing for keeping it
> together" (1979, p. 8)
>
> ... feel that things are real only if they can be
> measured. (1979, p. 3)

Further, he hints, as do many of the early environmentalists (Carson,

1972; Ehrlich, 1968; White, 1967) that continuation of this "blind"

alienation combined with our "positive" solutions to environmental

problems inevitably lead to the destruction of the human species

("doomed as a viable species").

As do the environmentalists, Van Matre focuses on the current

man-nature interrelationship, describing it as emotionally and

perceptually misconceived. Man does not have a "sense of place" in

natural systems and this will eventually lead to his or her self-inflicted destruction.

Van Matre's intended view of natural systems is intimately tied to this misconception of the man-nature association. Taking the stance that every individual should develop a personalized "sense of place" in the universe, he focuses on the means for bringing this about. It is viewed as possible, only through the development of an association with the natural environment. Van Matre describes the "sense of place" in terms of this association.

Description of the "sense" component starts here with Van Matre's discussion of the term (Van Matre, 1974, p. 20). "To sense" is related to the ability to perceive "the world fully", requiring physical contact with "out there" as well as breakage of those "barriers" (physical and mental) which "get between you and natural forces".

Various references to the sense of place (refer to Appendix C, Table 2) suggest that this "sense" is associated with a feeling of kinship with all living things (Appendix C, Table 2, III U). An intuitive "knowing" about natural systems, including "feelings of relationships" (II Q, II S), become "embedded" (II P) and serve as a "mental touchstone" (II Q), "a point of reference" (II O) or a "home" (II E, II S, II T).

> Natural awareness is a many-sided quality: it is an
> illuminating beacon stabbing through a foggy under-
> standing of life.
>   (Van Matre, 1974, p. 17)

This "continued source of awareness about who and where they [the

students] are" is to be viewed as "an intrinsic part" (II D) of the

individual; a culmination of natural awareness heading to self-

awareness. The phrases and terms utilized in the description of the

feelings involved here associate the "sense of place" with an "alert"

state of natural awareness: natural openness, feeling of oneness,

unity, becoming one with nature, getting in touch with the essence

of... and so on (as listed in Table 5-2 and Appendix C, Table II).

Describing this sense of relationship Van Matre uses emotional as well

as sensory association. The sense of unity will "transcend knowing"

and involve "flowing easily", losing self-consciousness and become

supremely tuned to the rhythms of the cosmos.

This description of the "sense" component is tied to the type of

"place" with which one is to achieve unity (Refer to Appendix C, Table

3 and Table 5-3).

> ... try to see yourself as fitting into the unity of
> nature. To become one with the natural world is not
> just to see the wholeness. It is to BE, to recognize
> one's place in that whole -- to stand as a brother with
> the stones and the trees.
>   (Van Matre, 1974, p. 167)

Table 5-2

Descriptive Terms and Phrases Used by Van Matre to Describe
the "Sense" in a "Sense of Place" in Natural Systems
(Taken from Appendix C, Table 2)

Reference	Terms and Phrases	
Acclimatization (1972)	deep and abiding love absorb its [nature's] mood draw it [nature] close to love it [nature] intrinsic part of himself feel at home with	familiarize sensitize naturalize harmonize
Acclimatizing (1974)	unifying experience instill natural openness "thou canst not stir a flower without troubling of a star" spirit of joie de vivre crescendo of emotion feeling of oneness return to childlike innocence and harmony supremely tuned to the rhythms of the cosmos get in touch with the essence... losing self-consciousness becoming one with nature flowing easily lose yourself as fitting into the unity of nature	
Sunship Earth (1979)	one's role as part of the ecological process sense of relationship kinship understanding transcends knowing	

Table 5-3

Descriptive Terms and Phrases Used by Van Matre to Describe
the "Place" in a "Sense of Place" in Natural Systems
(Taken from Appendix C, Table 3)

Reference	Terms and Phrases
Acclimatization (1972)	unity of nature (twice) patterns of life and man's role therein interrelatedness of all life immersion (baptismal) in nature

Acclimatizing (1974)	coalescence in the sun's web of life
	merge with
	mind/body involvement in
	* Everything goes somewhere
	● You can't do just one thing
	  Everything has its own sound
	  complex manifestations
	  "piece of the sun" (twice)
	bask in natural rhythms
	    living with nature

Sunship Earth (1979)	tightly woven fabric natural systems sense of harmony interrelatedness of life sparks of organized energy interlocking relationship rhythms of earth natural harmony and flow external relationship with Sunship Earth bound up every other living thing unity of nature harmony with the earth definite intimate relationship unity of nature become one with natural world stand as a brother with the stones and the tress place within the harmony

To fit into this "unity of nature" requires becoming a component of nature's tightly woven fabric (3X), the interrelatedness of all life (3F, 3G), and/or the interlocking relationship of life's systems. More specifically, it is a "mind/body involvement" (3I) attuned to the rhythms and harmony of the natural environment. Man, perceived as a "coalescence in the sun's web of life" (3H) is bound by such properties of living systems as "everything goes somewhere" and "you can't do just one thing" (3K).

> For man IS a part of nature; putting himself against his environment is but an egotistical folly. Man can never really overcome nature, because he cannot overcome himself. Far better that he seek his rightful place within the harmony, the ongoing life of the natural world.
> (Van Matre, 1979, p. 208)

2. Van Matre's "Description" of Natural Systems

As indicated in the emphasis of the man-nature association, Van Matre focuses his discussion related to natural systems at an "ecological level" (see Appendix A, Table 4). He begins _Acclimatizing_ (1972) with an epigraph he and his associates developed:

THIS WEB OF LIFE

LIGHT, AIR, WATER, AND SOIL ARE THE ELEMENTS OF LIFE,

LIFE IS DIVIDED INTO PRODUCERS, CONSUMERS, AND
    DECOMPOSERS,

EVERYTHING IS BECOMING SOMETHING ELSE;
    EVERYTHING HAS A HOME,

HOMES IN A DEFINED AREA FORM A COMMUNITY,

INHABITANTS OF THESE COMMUNITIES LIVE TOGETHER IN
    COMPETITION, COOPERATION, OR NEUTRALITY;

MAN IS THE CHIEF PREDATOR.

(Van Matre, 1972, p. 5 and 18)

This "view" emphasizes ecological interrelationships tied to biogeochemical cycles, energy flow and the concepts of community and succession. These "interlocking" relationships of life's systems are further described with such terms as pattern, harmony, rhythm, fragility, variety (complexity) and balance.

Van Matre, like other environmentalists and environmental educators (Hart, 1979, p. 91) has chosen the ecological level for viewing natural systems in order to maintain a hold on "wholeness" and "our" place in what wholeness... the biosphere (and ultimately the cosmos).

The world IS a whole. We just happen to perceive or
focus on one part of it at a time.
        (Van Matre, 1974, p. 167)

... Our goal is not pulling apart the insides of the
frog, but understanding the frog inside the pond and
the pond inside the water cycle.
        (Van Matre, 1979, p. 8)

It is this "wholeness" (in terms of an ecological understanding) and the component's synergistic interrelationships (and their properties

of harmony, balance, rhythm, patterns, etc.) which Van Matre expresses as his "intended" view of natural __systems__. Through natural awareness and, then self-awareness, students will achieve a "sense of place" in terms of a oneness or unity with this natural environment.

3. Discussion and Summary

That man needs to acquire a sense of identity and unity within natural systems is a focus described and discussed by Van Matre and many environmentalists and environmental educators. Specifically however, Van Matre's ecocentric emphasis of the man-nature interrelationship overlaps with "the bioethic" line of reasoning and/or the deep ecology movement described by O'Riordan (1981) and Devall (1980) respectively.

At the core of Van Matre's intended view of natural systems are an ecocentric's basic presuppositions: (1) there is a "natural order in which all things [move] according to natural law" (O'Riordan, 1981, p. 1); and (2) this "web of life" shows a harmony and balance which must be maintained if man, as a species, is to survive. Within this context a view of an "appropriate" man-nature relationship can be described which utilizes characteristics of both bioethics and deep ecology.

Both the bioethic line of reasoning and deep ecology environmentalism draw their inspiration and some fundamental structuring from the romantic transcendalists (Devall, 1980;

O'Riordan, 1981). This emphasis is shown by Van Matre. The romantic transcendentalists of mid-nineteenth century America turned to nature's "morality" as a key component of the man-nature interrelationship.

> Nature, they claimed, enjoyed its own morality which, when understood, could lead the sympathetic and responsive human being to a new spiritual awareness of his own potential, his obligations to others, and his responsibilities to the life-supporting processes of his natural surroundings. (O'Riordan, 1981, p. 3)

Natural awareness became the route to individual self-actualization and subsequent movement to "appropriate ecological action". Van Matre's whole program is structured around this premise. Development of natural awareness, through the components of acclimatization, focus on establishing individual connections with natural systems (establishing a sense of place as described above) which will promote self-awareness and examination of life-styles and develop and maintain an "ecological consciousness". Showing directly the impact of Thoreau on the program, for example, Van Matre offers a "Walden Solo" (3-day solo experience) in Acclimatizing, 1974. It is intended to provide time in natural systems for the development of non-verbal skills (e.g. receptivity, openness and silence) which will promote clarification of life-style values. Van Matre states that the

> Walden solo is an experience in what it means to be a human body.
>   (Van Matre, 1974, p. 221)

Another premise arising in the bioethic and deep ecology lines of reasoning is that of a "biotic right". Writers such as John Muir and Aldo Leopold emphasized "Nature ... contains its own purpose which should be respected as a matter of ethical principle" (O'Riordan, 1981, p. 4). This emphasis focuses on man's moral/ethical responsibility to pay attention to his/her impact on natural systems; judging his/her) effects in terms of maintaining natural processes. His/her) "rights" are weighted within the context of the rights of natural systems. An essential humility of man in this "web of life" is stressed (O'Riordan, 1981, p. 7).

This premise is also apparent in Van Matre's rationale statements. From an emphasis on development of natural awareness and conceptualization at an ecological level, respect for natural processes will arise only with a desire to choose "life-styles" which do not conflict with these processes. In the rationale of activities such as the "Muir Trek", "Seton Journey" or "Walden Solo" (in Acclimatizing, 1974) it is emphasized that appropriate time spent in natural surroundings will promote re-evaluation of life style values and personal growth in the direction of self-awareness and ecological consciousness. Thus, along with the bioethical viewpoint, Van Matre assumes that once faced with "natural limits" and "homeostasis" man will choose to incorporate these into a bioethical framework.

Van Matre's intended view appears to also be representative of the deep ecology movement described by Devall (1980). Devall outlines

both the sources of inspiration and the basic characteristics of deep

ecology (defined in Table 4-1). These are summarized in Tables 5-4

and 5-5 respectively, along with components of Van Matre's rationale

statements (description) which overlap the inspiration source or

characteristic.

Four sources of inspiration for deep ecology listed in Table 5-4

are Eastern spiritual tradition, re-evaluation of Native Americans,

minority traditions of Western religious and philosophical thought and

the scientific discipline of ecology. Note that the predominant

analogies and author references used by Van Matre overlap in that they

are drawn from similar "sources of inspiration". In an effort to

clarify his view of natural systems and an "appropriate man-nature

interaction" Van Matre consistently draws analogies or author

references from the same four areas.[1]

Table 5-5 lists the basic principles of the deep ecology

movement. Based on the information structuring the intended view of

natural systems, the degree to which each principle is incorporated

into Van Matre's view is indicated in the right-hand column.

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[1] Authors which Van Matre cites in the three books but which are not included in Devall's paper are the following: Longfellow (1974, p. 4); F. Thompson (1974, p. 14), B. Commoner (1974, p. 15), G. Harden (1975, p. 15), W. Blake (1974, p. 17), R. Carson (1972, p. 73), Joubert (1972, p. 87) and Kent (1972, p. 127).

Table 5-4

Sources of Inspiration for the "Deep Ecology"
Compared to Analogies and References Chosen by Van Matre
to Elaborate on the Intended View of Natural Systems

Sources of Inspiration Devall (1980)	Devall's (1980) Description	Van Matre's Reference -- Indicating Similar Source of Inspiration
1. Eastern spiritual tradition	Radically different vision of man-nature interaction. overlap with anti-science revolution. Parallels presented between Eastern philosophies and "new metaphysics" - alternative approach to science, nature and human values (p. 304-305)	Japanese - shibui (1974, p. 14) Lao-Tsu - practice of Tao (1974, p. 18) Haiku (1974, p. 152)
Authors cited:	A. Watts, D. Suzuki, G. Snyder, F. Capra, J. Needham, H. Smith	
2. Re-evaluation of Native Americans	Re-evaluation in terms of their traditional religions, philosophies and social organization, especially here -- interaction with natural systems as incorporated culturally (p. 305)	American Indians - "mother earth" concept (1974, p. 34) 151? Use of Indian as spokesperson -- examples Chief Seattle (1979, p. 34) "Journey Home" (1979, pp. 233-237)
Author cited:	R. Ornstein	
3. Minority tradition of Western religions and philosophical tradition	Alternative - "healthy basis" for realistic portrayal of the balance and interconnectedness of man and nature Bioethical focus (p. 306)	Muir Trek (1974, p. 174) A. Leopold (1974, p.174) Seton Journey (1974, p. 201) Walden Solo (1974, p. 208) A. N. Whitehead (1972, p. 87)

Table 5-4 (Continued)

Sources of Inspiration Devall (1980)	Devall's (1980) Description	Van Matre's Reference -- Indicating Similar Source of Inspiration
4. Ecological discipline	In terms of supplying an alternative perspective -- "an ecological ethic of interdependence, man in nature" ... (pp. 306-307)	Emphasis described previously on ecological conceptualization of natural system in terms of man in nature -- "as one". (refer to Appendix C)

Table 5-5

Deep Ecology's Basic Principles
Compared to Characteristics of Van Matre's Intended View

According to deep ecology (from Devall (1980, p. 310-313))	From the description of Van Matre's Intended View
1. New cosmic/ecological metaphysics stressing identify (I/Thor) of humans with non-human nature -- necessary condition for viable approach to building an eco-philosophy (Wholeness and integrity of person/planet and biological equalitarianism)	Basic premise
2. Nature must be approached objectively (as opposed to subjective anthropocentrism)	Inferred -- in terms of his criticism of the "frontier" view
3. New psychology is needed to integrate the metaphysics in the mind of post-industrial society (reject object/subject, man/nature dualisms -- awareness of total intermingling of the planet earth)	Basic premise
4. Objective basis for environmentalism -- different from the narrow analytic conception of "scientific method" currently popular	Basic premise
5. There is wisdom in the stability of natural processes unchanged by human intervention	Basic premise
6. The quality of human existence and human welfare should not be measured only by quantity of products	Inferred
7. Optimal human carrying capacity should be determined for the planet ...	No information

Table 5-5 (Continued)

According to deep ecology (from Devall (1980, p. 310-313))	From the description of Van Matre's Intended View
8. Treating the symptoms of man/nature conflict ... may divert attention from ... and thus be counter-productive ... to "solving" the problems	No information
9. New philosophical anthropology will draw on data of hunting/gathering societies for principles of healthy, ecologically viable societies	Inferred from the use of Native Indian spokesmen
10. Diversity is inherently desirable both culturally and as a principle of health and ecosystem stability	Basic premise
11. Move to "soft energy paths" and "appropriate technology" ... lifestyles which reduce per capita energy consumption	Inferred
12. Educational goal should be encouraging the spiritual development and personhood development of members of a community ...	Basic premise
13. More leisure as contemplation in art, dance, music and physical skills will return play to its place as the nursery of individual fulfillment and cultural achievement	Inferred
14. Local autonomy and decentralization of power is preferred over central-ized political control ...	No information
15. In the interim, vast areas of the planet biospheres will be zoned "off limits" to further industrial exploitation and large-scale human settlement ...	No information

Several of the principles of deep ecology appear to overlap with basic premises of Van Matre's intended view. Stated only in terms of this view of natural systems the two are similar in that both state or incorporate the idea that

1. man should "flow" within the "web of life", recognizing the unity of person/planet (cosmos) and the biotic rights of non-human nature (Table 5-5, item #1)

2. the view of the natural environment must incorporate a man/nature, mind/body "wholeness", fueling biotic rights and spiritual and emotional development (Table 5-5, item #3)

3. objectivity in terms of, for example, an ecocentric perspective (not egocentric) must be achieved. The current objectivity emphasizing, for example, separation of observer and observed, subject and object, is not desired (Table 5-5, items 2 and 4)

4. natural systems have inherent stabilizing mechanisms with which man must not interfere. This includes diversity as a key property of ecosystems (and cultures), ensuring the maintenance of this stability (Table 5-5, items 5 and 10)

5. "educational goal should be encouraging the spiritual development and personhood development of" each

individual (Table 5-5, item 12)

6. a change in life style values is required and will

    involve drawing on principles of hunting/gathering

    societies as well as moving toward lifestyles which

    reduce per capita energy consumption (Table 5-5, items

    6, 9, 11, 13)

Van Matre's intended view of natural systems is thus an

expression of a bioethic and deep ecology perspective. Man's current

positon is viewed as "outside" and as exploiter of natural systems. A

shift in this position is perceived as possible through individuals

acquiring a sensory and "mind/body" knowledge of natural systems.

This will attune them to the harmony and rhythm of the biosphere.

From such natural awareness will develop a self-awareness which will

guide individuals to make "appropriate" decisions about their

life-styles.

Van Matre's rationale statements draw on the same "sources of

inspiration" as the deep ecologists. These clearly present "current"

man, or perhaps "cultural man" as separated from natural systems. Man

must "somehow" re-enter the natural world by making fundamental

changes in his/her perspective. "Ecological" holism is a primary

structural framework for developing the "natural" and self-awareness

necessary. That humans share these fundamental characteristics of

homeostasis, optimum values, harmony and rhythm at less than an ecosystem level is not a perspective drawn on by Van Matre or the deep ecologists. Their ecocentric stance is so strong that it in fact takes on an anthropocentric component itself. Utilizing "wholeness" as the only perspective fragments the view of natural systems, of man's connections with them and of man as a species.

Author's Operationalized View of Natural Systems

The operationalized view of natural systems is embedded in the design or pattern of the educational program support elements: the instructional elements (materials and methods; roles and relationships) and the contextual elements (learning environment elements). The major "support elements" comprising Van Matre's program include (1) the sunship earth analogy, (2) the ingredients of acclimatization (ecological concept development, sensory awareness, solitude, mechanics of learning and magic), and (3) the context of a residential and natural setting. Through these elements Van Matre has structured a program to enable students to gain a "sense of their place" in natural systems as well as grasping the intricacies of the operating "whole".

A. Instructional Support Elements

1. The Sunship Earth Analogy

> Hey, we're on a sunship
>   How does it work and feel?
> We're both its passengers and its crew.
>   What does this mean for you?
>
> (Van Matre, 1979, p. xx and 36)

The decision to focus on "our place in space" was followed by the decision to structure the program around a spaceship or sunship earth analogy. The comparison drawn between planet earth and a spaceship/ sunship is viewed as an "effective explanatory device ... to aid in understanding earth's vital and fragile life-support system" (Van Matre, 1979, p. 37). As described previously, this view formed the basis for extensive use of the spaceship earth metaphor in the environmental movement. Van Matre states two reasons for changing the name from spaceship to sunship: (1) to emphasize the importance of the sun as the sole source of energy (the sun is the "mothership") and (2) to deemphasize the importance of man since "spaceship" tends to visualize "man-made" structures.

The sunship earth analogy was then "brought to life" through the design of a residential outdoor program. At the "Sunship Study Station" students are viewed as "passengers and crew" on the sunship which is described as "moving rapidly through space ... on a voyage

with no measurable end and no definite beginning" (Van Matre, 1979, p. 2). The "mission" of each student is to learn how the sunship operates and then to choose "lifestyles" which ensure its maintenance. The analogy is meant to permeate everything the student does, drawing together "the curriculum" and "the residence". Students "learn the patterns they live" (Van Matre, 1979, p. 38).

Various articles and "props" maintain the sunship theme throughout each day and the week:

1. Before arriving at the Sunship Study Station, students, "the passengers" apply for passports. Once there, a "ceremonious occasion" involving fingerprinting, signatures and official seals, marks the issuing of the passports. These passports "ensure" entrance to all of the concept learning stations. They are also used as notebooks and are "officially" stamped when a given concept has been grasped.

2. The "Welcome Aboard" introduction is designed to orient the student "in space" as a passenger and crew member on the sunship. Incorporated into the orientation is the film, "Cosmic Zoom" and a description of the "earth as a spaceship" commonly seen in environmental and environmental education literature (Ehrlich & Ehrlich, 1970; Fuller, 1970; Tanner, 1974).

3. Each day "crews" move through concept paths learning
   about the operation of the sunship. Between stations
   they are urged to watch for other sunship "passengers".
   "Mug shots" of these sighted passengers are put on a
   "Passenger Mural" and are accumulated for the week.

4. All workshops, time out activities, meals, cabin and
   Outdoor Inn decor, etc. meet specific requirements of
   contributing to the sunship metaphor.

5. The final sequence of activities (Model Planets,
   Sunship Meeting, Passenger Guide and Beginnings Not
   End) bring closure to the week's work by structuring a
   connection between the students' new understanding of
   how the sunship operates and their lifestyles.
   Maintenance of the sunship's life support system is
   emphasized, in terms of the consequences of the
   student's own activities.

The sunship analogy serves as the focal point for overall
conceptualization of the student's "sense of place in space". Man
lives on a finite, fragile planet. He is a component of the biosphere
and dependent upon the maintenance of the natural systems comprising
it. Based on the emphasis of the analogy, man's place is one of
responsibility as a passenger and as a crew member. The analogy tends
to take on an egocentric view in terms of the man-nature relationship.

It is this aspect of the "spaceship earth" metaphor which has been sharply criticized by some environmentalists and environmental educators. The metaphor is felt to be too technological and inherently too anthropocentric (Innis, 1975; Miller, 1982). It preserves man's ability to gain _full_ understanding of natural systems and, ultimately, to be capable of its complete (and appropriate) control. Although this is a fundamental component of the ecological/ scientific environmentalism (described by Sandback, 1980) it is in sharp contrast to the focus of deep ecology (Devall, 1980), or anti-establishment environmentalism, both described previously as representative of Van Matre's intended view of natural systems.

2. Ingredients of Acclimatization

As "instructional support elements" in this curriculum material the ingredients of acclimatization include ecological concept development, sensory awareness, solitude, mechanics of learning and magic. Each of these will be considered separately in terms of its contribution to the operationalized view of natural systems. Keep in mind that "acclimatization" has been framed within that context outlined previously by the sunship earth analogy.

(i) Ecological concept development

Van Matre chooses to emphasize concept development as one "vehicle" for acclimatization. Concepts are described as "mental

constructs which serve to classify or categorize everything with which we come into contact" (Van Matre, 1979, p. 22). Used to make sense of the world, they are viewed as dynamic, changing structures, altered through the presence or absence of new data. In <u>Sunship Earth</u> Van Matre emphasizes concept development through a a method of "building concepts" called IAA (Informing, Assimilating, Applying).

The IAA concept building process structures the sequence of events which occur at each learning station on a concept path. First, the students are <u>informed</u> of the station's essential theme: A student reads aloud, from his/her passport, the key concept statement and explanatory paragraph; and the "prop" boxes all have the appropriate concept statement and paragraph stamped on their lid. Next, the students <u>assimilate</u> the concept by completing the activity outlined by the crew counselors (these are listed in Table 5-6). Finally, the concept is <u>applied</u>. Each student finds an example of the key concept from the natural surroundings. The example is entered into the student's passport (by writing and drawing) and, subsequently, rubber stamped with the concept name.

Once the sunship earth theme was chosen, concept development focused on seven basic ecological concepts: energy flow, cycles, diversity, community, interrelationships, change and adaptation (EC-DC-IC-A). (This mnemonic device, EC-DC-IC-A, is used as a study station slogan.) Thus, similar to environmentalists and environmental educators, Van Matre relies heavily on conceptualization and

ecological concepts to maintain emphasis on the "big picture" as opposed to "differentiating smaller and smaller" components of the ecosystem. This emphasis on conceptualization and ecological principles is a first step to operationalizing a major component of Van Matre's intended view; "holistic" conceptualization of "the web of life".

Of interest here is how this conceptualization of ecological principles is structured within the IAA framework. Van Matre points out that "basic ecological concepts tend to be abstract because they are so large" (Van Matre, 1979, p. 24). In an effort to make them more tangible the Sunship Earth program relies heavily on "gimmicks and props". This is particularly noticeable in the "assimilation" activities of the concept paths (refer to Table 5-6). Every assimilation activity requires active student involvement through role-playing. The roles used on the concept paths (A, B and C) are listed in Table 5-6. As indicated here, the roles range from "gravediggers" to "mice", to "chlorospys" and so on. Each "role" involves the use of "props" found in the prop boxes of each learning station. The role-play is set by an analogy between the concept idea and a more "hands-on" model, problem or example. In Table 5-6 note that in more than seventy five percent of the activities the analogy is drawn from human structures or activities, for example, funerals, restaurants, food factories, spy missions and kitchens. In the other cases students take on the role of a component in natural systems such

Table 5-6

Assimilation Component of the Activities
Designed for Concept Development

A: Concept Path Activities - "activities on the concept path
   demonstrate the functioning of the seven concepts represented by
   EC-DC-IC-A formula" (Van Matre 1979, p. 41)

PATH A

| | Assimilation | |
Activity Title	Students Role-Play	Analogy
Cradles to Coffins	Grave-diggers Mourners Birthday Party	Cycle -> Funeral Component (Birthday)
On the Street Where You Live	Census Taker	Community Residents on Street of Com- munity
Guess Who's Coming to Dinner	M. Interview for Predator Mouse Coyotes	Hunt Mouse Panel Interview
Mr. Sun's Restaurant	Members of food chain	Restaurant/Banquet
Peanut Patch	Squirrel	Squirrel

PATH B

Declaration of
Interdependence
	"Subject in
	  Revolt"
	Have "Amulet" to
	  be safe from king
		Battle (Defiance)

Cliff Hangers	Various Plant "Characters"	Hanging onto Boulders - Rules

Table 5-6 (Continued)

| Activity Title | Assimilation | |
	Students Role-Play	Analogy
Food Factory	Molecule Messenger "Chlorosphy" (Undercover Chloroplasis)	"Spy Mission" into Leaf Food Factory (Chlorophyll Central Center)
Sun's Bucket Brigade	Clouds (Members of Sun's Bucket Brigade)	
Root Seller	Part of a Plant - The Story	Roots - Deeper Personalities" of the Plants

PATH C

Missing Passenger Hunt Tools and Tasks	Detectives Game - Get Flower Nectar	"Missing" "Scene of Crime" Bird Beaks = Tool
Chain Gang	Position in Food Chain (Transferring Energy)	Bucket of Water = Energy
Soil Sinks	"Soil Builders"/ Storms Freeze/Thin Chefs	Soil = Kitchen Master "Chefs" Kitchen
Best Deal on Earth		

Table 5-6 (Continued)

B: Interpretive encounters - "culminating activities which take a
single concept from a concrete level to a more abstract level of
understanding" (151). Use a "central" problem-solving story line
to maintain flow through the activity

Activity	Students Role-Play	Analogy	Problem
Border Dispute	Trolls of Open Land Elves of Forest Land	War Inhabitants of Neighboring Communities Weapons = Proof	Gather Data to Determine Boundary
Model Planets	Construction of a Viable Life-Support System for "Earth" - Through Construction of Examples of the Seven Concepts	Interplanetary Development of Life-Support Systems for "Earth".	Construct Viable Support System for Earth

as a cloud or squirrel.

Role-playing involves taking on an "imaginary role" as indicated by an analogy. Students are active participants, emphasizing a perceptual/emotional involvement in the analogy. Two environmental education program support elements, orientation to environmental issues and active participation, would recommend role-playing as one method of instruction. It can provide "opportunities for increased understanding of many viewpoints, the operation of natural systems, examination of problems on a variety of scales and levels, and processes of decision-making and enhancing personal concern" (Hart, 1979, p. 108). Note however that role-playing is suggested as a teaching/learning tool primarily within the context of dealing with environmental problems/issues (real or imaginary) (Hart, 1979; Tanner, 1974). In other words the student takes on an imaginary but possible future role, to enhance the likelihood of his or her future involvement in environmental issues.

The role-playing outlined by Van Matre for the concept paths does not involve possible future roles for student participation in environmental issues. The roles are presented instead as alternative ways of "touching" the lives/activities of living systems. This assimilation component for conceptualizing holistic, ecological principles is largely egocentric. It is the student's cultural perception and actions which provides the insight, information, alternatives, etc. for structuring an understanding of ecological

principles. Similar to the sunship earth analogy, the assimilation components of the conceptualization process are man-centered. This use of "cultural lenses" for viewing and structuring information about natural systems is not compatible with the author's "deep ecology" perspective outlined as an intended view.

Other activities related to conceptualization of ecological principles incorporate concept synthesis as well as "active involvement" in environmental problems. These activities, called "interpretive encounters", are also listed in Table 5-6. The activity entitled "Model Planets" serves to begin extension and final application of the concept development process, as well as to introduce the issue of environmental problems. Students are asked to construct life-support systems, on various planets in the solar system, utilizing their understanding of the ecological concepts (EC-DC-IC-A). Subsequent movement of all the constructed life-support systems to the only planet which will support life (Earth) results in destruction and catastrophe since all the students attempt to crowd into a very small "earth". The issue of crowding and destruction of life-support systems is then discussed, and movement into the final activities is initiated: Sunship Meeting (students' presentation of "bad" environmental habits); Passengers' Closing Ceremony ("You can never again say 'I didn't know'. You are now aware of the sunship's operating systems, so you are fully responsible for your actions.")

This final stage of the conceptualization component addresses the

incorporation of environmental issues as a support element in environmental education programs. More specifically it serves as an example of the instructional support elements of "environmental issue orientation" and "active participation".

In terms of environmentalism these activities take on a "reformist" approach to environmental problems (refer to Table 4-1, Schnaiberg, 1980 and Devall, 1980). The focus has shifted to a means of treating "the symptoms of the environmental crisis". The means involve taking responsibility for one's actions and ensuring they are compatible with maintaining the earth's life support systems. This emphasis, although encompassed by deep ecology or anti-establishment environmentalism, is questioned as an "appropriate" focus in dealing with environmental problems. These environmentalists state that environmental problems arise from fundamental problems of epistemology, environmental ethics and metaphysics. The "fix it" approach of the reformists serves to cover the "real" cultural issues as well as to develop a false sense of control in the implementation of solutions (Devall, 1980; Schnaiberg, 1980). This sense of control is false based on both its inability to choose from all possible alternatives and to generate a long term solution.

Thus the "deep ecology" view of natural systems expressed in Van Matre's intended view contrasts with this extension of the operationalized view. The fundamental component of achieving unity and "oneness" and recognizing harmony and rhythm within natural

systems differs at a philosophical/epistemological level from the idea of "adjusting" our lifestyles, within the current, cultural context, to "appropriately" interact with living systems.

(ii) Sensory awareness

Sensory awareness (sharpening senses) was also chosen as a key ingredient of the acclimatization process. In Van Matre's terms this involves breaking barriers (many cultural) which prevent full usage of the five senses in natural settings. Simultaneously, students make contact with the "natural world: heightening senses, changing perspectives ... seeking patterns [and] sharing appreciations" (Van Matre, 1979, p. 173). Students are to "awaken", in a sensory manner" to the patterns and components of the natural environment.

This building of sensory awareness is the explicit focus of the activities included in "Touch the Earth", "Immersing Experiences" and "Discovery Parties" (listed in Table 5-7). In each activity all students have an active, first-hand experience with components of their natural surroundings. The tasks are designed to enhance the likelihood that new sensory perceptions will be experienced. For example, some of the activities involve removal of one sense (e.g. going blind), while others accentuate senses, patterns or views not normally relied or focused on (e.g. shadow catchers using the bosun's chair). In several cases this altered perception is guided within the framework of role-playing or simulations.

Table 5-7

Sensory Awareness "The Feelings"

"Touch the Earth" - follows introductory "Welcome Aboard session"
 - # of activities - "encourage various means of making contact with
   the natural world: heightening senses, changing perspectives, break-
   ing down barriers, seeking patterns, sharing appreciations and look-   for
   ing for small things' (173).

Activities	Task	Senses Altered
Bug's World	"shrink" students - walk along path blindfolded on all fours ...	crawl/"Blind" absence of sight "Think Small' Imagine
Share a Shadow	"Shadow Catchers" to look at shadows ... capture favorite shadow *Share	View of Object - Outline ...
Touching Trail	In pairs: Blindfold Partner - Lead to Feel Different Textures (marked as suggestions along trail)	"Blind" - Textures Empha- sized May also crawl "Get In Touch"
Magic Paintbrushes	Student as artist - select "canvas" - aspect of nature/ "paint"	Different perspective "Look" at Shore, Color, Detail ...
Bloodhounds	Role play - "dogs" and "trainers" Search out objects with a particular "smell"	Heightened - Sense of Smell
Magic Planet	View "planet" boulder, etc. through hand lens (orbit, then land)	Different perspective "small" - through hand lens

Table 5-7 (Continued)

Activities	Task	Senses Altered
Giants and Leprechauns	Giant - Bosun's chair - each student hoisted up Leprechauns - lie down - be small	Different perspective Altered from eye-level view

Sensory Awareness

Immersing Experiences - "These are activities designed to break down the sensory barriers between people and the natural world." They are multi-sensory and strive to change the vantage point of the partici-pant, therefore encouraging a fresh view of what may already have been familiar" (42). Emphasizes total sensory involvement of the natural world (191).

Activity	Task
Micro-parks	Set out boundaries for a micro-park/mark park's special attractions... (193) role - park guide/tourists admission - "peanuts" to "tours"
Curious Herrin Walk	Role-play - walk like heron - in water (lake) Place clues/observation tags for second group
Earth Studies	Draw - to represent feelings about places ... special "studio" "Immerse" each in a niche (expressing sensations)
Night Watchers	Nightwatchers - reflector to reflector "Station" to station (Note: Sunship metaphors and star, p. 202)

Table 5-7 (Continued)

Discovery Parties - opportunity to explore and wanter/rekindle sense
of wander

Activity	Task

Cost Centers   "Treasure" Hunt - Discovery
Find things which start with the letter ...

Artists and   Examine "unexplored" place using artists discovery
Scientists   kit -> artist's view, scientists discovery kit ->
scientist's view, onto map of area - display

As suggested by the activities, Van Matre emphasizes (within the limits of group work) an individualized student-directed format or sequencing. Once the activity has been set in motion, the crew counselor is to be a facilitator; encouraging and exchanging ideas, but _not_ passing information or directing unnecessarily. The comments/directives of the crew counselors are to aim at "feelings" and elucidation of responses to the experience. They are _not_ to be judgmental or sermonettes (Van Matre, 1979, p. 30). The experiences for sensory awareness activities are designed to promote individual natural awareness in terms of students' own current view of their "place in space". Further, the experience is meant to promote positive interactions within a natural setting.

This focus on individual sensory awareness is strongly advocated by environmentalists and environmental educators as an essential means of re-establishing man's connections with natural systems. Environmental educators point to firsthand and active participation in the natural environment as key elements in establishing a positive "sense of place" within "the cosmos" (Tanner, 1979). Such a foundation, in terms of a natural and self-awareness, is believed to be fundamental in initiating individual involvement in environmental issues.

Van Matre clearly addresses this emphasis in both his intended and his operationalized views of natural systems. The sensory awareness activities operationalize the desire to alter individual

perceptions of natural systems; moving from a view of alienation and exploitation to one of having a place within nature's patterns and rhythms. This focus is further developed by the inclusion of solitude and the concept of magic as ingredients of acclimatization.

(iii) Solitude

Solitude is also chosen as a major component of acclimatization. Periods of solitude are meant to provide time for the student to be in "direct contact with the basic elements of life: light, air, water and soil" (Van Matre, 1979, p. 9). It is viewed as a time for reflection; "a time just 'to be'" (Van Matre, 1979, p. 9). Further, it is believed to enhance "the acquisition" of non-verbal skills such as "waiting, watching and receiving".

Solitude is structured into the Sunship Earth program as "Magic Spots". Each day students spend some time in their "magic spot"; a place known only to them. Initially they are encouraged to imagine the full picture...

> a boy or girl sitting under a tree, the entire forest, the planet whirling through space around the sun, as in the movie presented in the sunship room. The idea is to get acquainted with this one small spot and to begin to develop a feeling for how it fits in as part of the larger sunship.
> (Van Matre, 1979, p. 189)

Other examples of guidelines given to the student are listed in Table 5-8. The instructions given are meant to set a stage allowing the students "to feel the flow of life around them" (Van Matre, 1979, p. 189).

The inclusion of this type of experience reinforces the students' involvement and sensory awareness within natural systems. In particular, it sets the stage for being in a natural environment when man's activities are <u>not</u> dominating. The activity and pacing observed is that of natural environments. Further "waiting, watching and receiving" will enhance making connections to the properties of rhythm, harmony and "flow" as described by the environmental educators and environmentalists, in particular the deep ecologists or anti-establishment environmentalists. This is also a major thrust of Van Matre's intended view.

(iv) Mechanics of learning

The fourth ingredient included as a component of acclimatization is referred to as the "mechanics of learning". Van Matre's inclusion of this component is to emphasize the importance of structuring the learning environment for outdoor experiences (Van Matre, 1979). Describing his "operating principles" he makes references to Skinnerian and Brunerian learning theory, as well as to Piaget's learning hierarchy and the affective components described by Huxley, Brown, et al. Table 5-9 lists those aspects which he has specifically

Table 5-8

Instructions for "Magic Spot"

Verbal Instructions:

Should be out of sight and hearing from spots chosen by others
... a place where you can sit comfortably, with a good tree or
stump to lean against" (188)

Magic Spot time is a time to sit quietly and alone -- that's the
one overriding guideline here. (189)

Seton-watching ... when you're completely comfortable, take a
couple of deep breaths and relax. As you breathe, settle into a
state of motionless. Don't move at all but don't strain. Just
relax. Let the natural world sweep over you and engulf you.
(189)

Suggestions listed in the log book: --
(meant only as suggestions to help them become familiar with
their spot) ... "do not have to be done" (188)).

Magic Spot Time

1. "... get seated in a very comfortable position, maybe
    sitting with your back resting against a tree and your legs
    stretched out. Fold your hands and put them in your lap.
    Then, take a couple of deep breaths and let them out slowly.
    Begin to relax, and try not to move around at all.

    "... begin seeing and feeling things you never noticed
    before."

2. Look for something so small you can hold in your hand. Look
    at it so closely you could pick it out of a pile of 20 other
    things like it.

    Crawl around in a small circle and look at other small
    things in your Magic Spot ... Write a poem ... Haiku

3. Listen to the sounds around your magic spot. Try not to
    name them, just listen. Think of them as instruments in an
    orchestra. Hear these patterns ...

4. Focus your eyes on something close, then something far away
    ... Take mental pictures of your Magic Spot, the close, the
    far and the in-between.

Table 5-9

"Mechanics of Learning" Summarized by Van Matre
to Describe His Instructional Theory

Skinner (programmed or stimulus-response learning)

+ focus on terminal behaviors (the application portion of the IAA
  model)

+ emphasis upon positive, frequent reinforcement (the leader's
  comments in conducting the activity, the youngster's feeling of
  accomplishment in solving the problem or performing the task, and
  the passport stamps awarded)

+ prompt feedback
  (the primary responsibility of the crew counsellor)

+ stress upon designing learning activities
  (the responsibility for learning is shared with the leader)

+ elimination of the adverse nature of questioning
  (questions used which facilitate the flow of the activity instead of
  testing the learner)

Bruner (discovery or field theory learning)

+ focus on reorganizing perceptions
  (the overall theme of the program)

+ emphasis upon structure
  (the attention to details and the stress on reaching closure)

+ assurance of active participation
  (the emphasis upon mechanics)

+ creation of a relaxed atmosphere about learning
  (the absence of testing and the presence of "magic")

+ attention to the provocative nature of tasks
  (the challenge of concept-building activities)

+ permission of mistakes
  (the group problem-solving approach)

Table 5-9 (Continued)

Bruner (discovery or field theory learning)

+ stimulation of awareness
  (the primary goal of the program)

+ emphasis on the importance of attitudes
  (the constant concern about how students _feel_ about what they are
  learning)

(Van Matre, 1979, pp. 27-28)

incorporated into the Sunship Earth program. (This list is from page 27 and 28 in Sunship Earth.)

These aspects of the mechanics of learning are of interest in terms of how they affect the structuring of the operationalized view of natural systems. Generally their incorporation serves to tie understanding and conceptualization to a "planned" learning situation in the natural environment. In other words, important components of natural systems can be and are best understood when "experiencing" or interacting with those systems in an informed and structural manner. This then sets the stage for dealing with properties emphasized by environmentalists, environmental educators and with Van Matre's intended view: conceptualization of ecological principles as well as "holistic" properties of nature (e.g. harmony, pattern, rhythms, etc.).

More specifically, referring to Table 5-9, Van Matre's "mechanics" are reflected in the structuring of the program, activities and suggested interaction with students. Note inclusion of active student participation, positive and immediate reinforcement (feedback), altering student perceptions and awareness, generating and affirming the importance of feelings/attitudes and structuring activities which are "provocative" and show closure in a "relaxed" atmosphere. These components of the "mechanics of learning" match with the materials and methods and roles and relationship support

elements described by environmental educators. This perspective of effective student learning is fundamental in operationalizing the intended view. The descriptions of the other ingredients of acclimatization reflect the degree of incorporation of these learning mechanics.

(v) Magic - the "glue"

The final component of acclimatization is the "glue" which binds the other components together: Magic. Van Matre describes this as an "undefinable quality" which must be present in the structuring of the activities.

> In ACC, magic is the all-important ingredient. It's what makes our learning activities captivating for kids and teachers alike. After all of our efforts at designing sensory and conceptual learning experiences, at examining the smallest detail of the mechanics involved, if we cannot weave some bright threads of magic through the activity, we toss it out. (Van Matre, 1979, p. 10)

Van Matre emphasizes that the presence of "magic" takes the components of acclimatization (described previously) and makes them greater than the sum of their parts. It is through this glue that the activities come alive and take on a meaning and excitement for students. Table 5-10 lists descriptive phrases of magic included in Sunship Earth. Van Matre (1979) begins this description of magic with the statement

"words can never convey the real scope of this idea" (p. 9). In
Acclimatizing, he describes child's play in a manner which, perhaps,
represents the "ultimate" achievement of this incorporation of magic.

> A small child enters totally into that world [where the
> familiar becomes the unfamiliar, the ordinary the
> miraculous]. There is no inner and outer dimension.
> There is no analysis or consciousness of time or
> withholding of self. What there is in the child's mind
> is the joy of play and the total giving of self to the
> moment .... pursue awareness until we return to that
> childlike innocence and harmony -- only on a "higher"
> level.
> (Van Matre, 1974, pp. 17-18)

Inclusion of this component again emphasizes the desire, in the
operationalized view, to set the stage for accessing a feeling for the
wholistic properties of natural systems; a means for tying mind and
body together or in an understanding of involvement and "flow" within
natural systems. This component is incorporated to ensure the relaxed
and open state required to develop an awareness of the person/planet
unity and the harmony and rhythms inherent in natural systems --
emphasized by deep ecologists, environmental educators and Van Matre's
intended view.

As a component of the operationalized view then "magic" is a tool
which Van Matre describes as important in working with people in
natural settings. Its precise incorporation into the curriculum
program is not clear when viewing the curricular materials since,
obviously, this "glue" depends on the attitude and sensitivity of

instructors and students alike. However, it does appear that the potential for its presence is structured through active student participation and a non-testing or non-evaluation atmosphere. Active participation is ensured by the structure of the sensory activities as well as the role-playing (fantasy, imaginary) of the concept activities.

> ... encouraging a "whole body response" -- balancing
> seriousness with fun and good feelings.
> (Van Matre, 1979, p. 22)

B. Contextual Support Elements

The "situational context" described for the Sunship Earth program involves living in a "natural setting" for five days. The residence component is not considered to be essential, and various alternatives for one-day experiences are described. However, the context of a natural setting is essential. The noise and cultural milieu of urban settings do not present an environment which promotes altered perceptions for the initiation or development of natural awareness (and hence self-awareness).

Van Matre describes the search for an appropriate "means" of developing natural awareness in the context of natural settings. The teaching experiences of Van Matre and his co-workers eliminated scientific tools (identify-collect-experiment) as an appropriate means for developing the awareness. They developed the acclimatization

approach, operationalizing their intent to alter the interaction between "the student" and the natural environment. Acclimatization is designed within the context of the natural setting.

Obviously this use of natural settings consistently operationalizes Van Matre's intended view of natural systems. It is necessary in terms of both altering the student's perception of man-nature interactions, and tuning in to the ecological principles and the wholistic properties of harmony, balance and rhythm. Further it coincides with the major contextual element of environmental educators: field studies. First-hand experiences within natural settings is essential. "People must be reunited, must identify with the natural environment if they are to recognize its inherent value" (Hart, 1979, p. 117).

Van Matre's specific use of the "setting" and the type of interaction which he encourages between it and the student is outlined in the description of the acclimatization components. In summary, note that the interaction includes altered sensory perception, role-playing, magic, gimmicks and props, application of ecological concepts, observation and solitude (waiting, watching and receiving).

C. Summary: Internal Consistency Between the Author's Intended View and Operationalized View of Natural Systems

Table 5-10 summarizes the areas of overlap and dissonance between the author's intended view and operationalized view, as outlined in the _Sunship Earth_ curricular materials. These areas of overlap and dissonance are noted and described within the context of the environmental movement and environmental education. Particular emphasis is placed on descriptions of the environmental movements which related specific combinations of characteristics to specific types of environmentalism. The combination of "concepts" presented in the rationale and design of the curricular material indicates Van Matre's intended view reflects the "deep ecology" perspective while his operationalized view lies more in the ecological/scientific environmental movement.

The main area of discrepancy between the intended and operationalized view lies in the perspective of man's "place in space". Both describe man's place in terms of the ecological principles and holistic properties of natural systems but they differ in the degree to which man is "one with" and is governed by, _or_ governs through, these principles and properties. Van Matre's extensive rationale statements reflect the "environmentalism" which Devall (1980) labels "deep ecology". Man's place is viewed as one of "units" within ecological systems. Achieving knowledge of the

Table 5-10

Areas of Compatibility and Incompatibility
Shown Between the Author's Intended and Operationalized Views

Operationalized View	Operationalized View As It Compares And Contrasts With The Intended View	
Support Element	Coincide	Possible Contradictions

I. _Instructional_

A. Sunship Earth Analogy

Emphasis - _conceptualization_ at the "holistic" level (ecologically and in terms of man's place in nature (cosmos))

Level of technology implied in the analogy -- ability to know and control natural systems

B. Ingredients of ACC
1. Concept development
a. Informing & assimilating

Emphasis - conceptualization, ecological principles, "holistic" properties of the "web of life"

A major component of assimilation activities is role-playing -- both egocentric and anthropocentric

b. Application

Need to reconsider our life styles and habits in terms of ecological principles

Short-term alterations in daily habits shows responsible action ("now aware of the sunship's operating system, therefore)

2. Sensory Awareness

First-hand, active experience in natural surroundings -- emphasis on increased/ altered sensory awareness

--

3. Solitude

A tool -- providing relaxed time in natural settings, emphasizing altered pace and form of interaction. Emphasis on waiting, watching and receiving

--

Table 5-10 (Continued)

Operationalized View Support Element	Operationalized View As It Compares And Contrasts With The Intended View	
	Coincide	Possible Contradictions
4. Mechanics of Learning	As incorporated into the other components	
5. Magic	A component meant to enhance relaxed atmosphere and involvement of total mind-body/ cognitive-affective experiences	As structured into concept path activities tends to involve anthropocentric approach, e.g. role-playing to set the stage ...

II. Contextual Element

| A. Natural setting | Active, first-hand participation by each student with the natural setting | -- |

inherent harmony, rhythm and balance of natural systems will ensure actions which are in concert with these properties. Thus, natural awareness is viewed as an essential component for achieving self-awareness, hence, self-actualization. This view of man and nature carries with it the understanding that our current socioeconomic structure contains fundamental epistemological, ethical and metaphysical errors in its interaction patterns within natural systems. Thus fundamental perspectives of nature and "culture" must be reassessed and changed.

The operationalized view of man's place in natural systems (as presented in the overall program design and specific acclimatization components) reflects a shift away from the deep ecology perspective of the intended view. This shift is toward an ecological/scientific environmental perspective, as described by Sandberg (1980). As expected from the intended view, the components of acclimatization focus on development of individual sensory/natural awareness and conceptualization of holistic properties and ecological principles. This is consistent with the perceptual concerns of the deep ecologist. Sensory awareness, solitude and aspects of magic specifically present opportunities for formulating or reconceptualizing an individual's connection with (or perceptions of) the natural environment.

The shift toward ecological/scientific environmentalism occurs primarily through the sunship earth metaphor and the assimilation activities designed for ecological conceptualization. These

components present a man-nature relationship which is in contrast to the deep ecology movement. Drawing on cultural metaphors and analogies, the properties of natural systems are viewed through an anthropocentric or egocentric lens. This contradicts the thrust of the sensory awareness components which focus on a "waiting, watching and receiving" study of natural systems; emphasizing nature's pace and events. The former components, concerned with encouraging student involvement, concrete conceptualization and "magic", structure experiences viewed through man's cultural pace and priorities. This "sudden" shift from an ecocentric to (cultural) egocentric lens suggests a perceptual shift in man's "place in natural systems" from "one of a unity" to "one separate from" and capable of "appropriately" knowing and altering natural systems. Viewing natural systems through a cultural (anthropocentric) lens is in sharp contradiction to the premises of the deep ecologists (and hence the thrust of Van Matre's intended view), however, it is a basic premise of the ecological/scientific movement.

Within this shift are the various ways of viewing ecology and the degree of understanding it provides man about natural systems. Both environmentalists and environmental educators place ecological principles at the core of the knowledge base for understanding environmental issues. It is its association with the socioeconomic structures as well as other forms of "knowledge" which contribute to the varying views of the man-nature relationship. The ecological/

scientific environmentalist views ecological understanding as man's tool for controlling natural systems and man's impact upon them. Thus the rulers of the world would ideally be ecologists using scientific and technological advancements to control man's activities. On the other hand, deep ecologists view ecological understanding as a tool for undermining basic premises upon which the socioeconomic framework sits. In other words, as a deep ecologist, if one accepts the ecological and holistic principles of natural systems then one must reject many cultural "habits", reassessing the man to nature (and the man to man) relationship on a global scale.

The dissonance created by these differing views of ecology is apparent not only in Van Matre's differing treatment of sensory awareness and assimilation activity of conceptualization but also in the concept synthesis and closing ceremonies of <u>Sunship Earth</u>. A basic premise inherent in the emphasis and structure is that once someone realizes "his or her place" in natural systems, he (or she) will be moved to act in an environmentally appropriate manner. This in turn is based on the premise that he or she will be <u>able</u> to do so. This, again, is a key perspective held by "reformists" (Schnaiberg, 1980) and ecological/scientific environmentalists. However, as stated previously, deep ecologists consider the parameters of the cultural context. Within this socioeconomic and political framework the ability of each individual to act in an "environmentally sound" manner is severely limited. Deep ecologists advocate that man's energies

must be directed toward development of a new epistemological, ethical and metaphysical framework for viewing man and natural systems.

A program structured from a deep ecology perspective of the man-nature relationship but incorporating a reformist's or ecological/ scientific environmentalist's view in operationalizing this perspective is bound to generate areas of considerable internal dissonance. However, the work of Van Matre and his co-workers presents the areas of major concern and controversy in the environmental and environmental education movements. What "information" must we incorporate to restructure our view of natural systems? How is this incorporation best achieved? How are these new perspectives to be operationalized into "environmentally sound" action?

CHAPTER 6

Assessment of the "Success" of the Critique

This editorial critique has focused on the conceptualization of

natural systems as presented in the design, or pattern of selections,

making up the curricular material Sunship Earth. Based on the premise

that this design or pattern reflects the meaning system operational

during curricular development, it presumably carries conceptual

information about specific content components. Discussing this design

or pattern is one means of considering the impact of the "choices

made", as reflected in the explicit, implicit and null curricula, on

the conceptualization of natural systems. Using editorial criticism,

the concepts of natural systems structured in the Sunship Earth

materials are described and discussed against the backdrop of

environmentalism and environmental education.

Environmentalists and environmental educators emphasize that man

must reconceptualize his/her place within natural systems as well as

his/her view of the properties of the natural environment. He (or

she) must acknowledge their connections within the web of life and

view "holistically" their place in space and the operation of natural

systems. Achieving such perspectives may require fundamental

epistemological changes, extending to the establishment of an

environmental ethic and alterations in current socioeconomic premises.

For this reconceptualization of natural systems many informational and

experiential components must be reviewed, restructured, and reordered.

Sunship Earth is a curricular program which specifically addresses these concerns. The acclimatization approach outlined by Van Matre and his co-workers is explicitly designed to structure student conceptualization of his (or her) "place in space" and of the holistic properties of natural systems. The program incorporates affective and ecological conceptualization of natural systems in a non-traditional manner. The current analysis focuses on the degree to which the author's intended view of natural systems is reflected in the operationalized view utilizing the acclimatization approach. These views are compared against a backdrop of the conceptualization of natural systems described by environmentalists and environmental educators (writing in the same time period). This analysis and summary discussion make up Chapter 4 and Chapter 5.

An assessment of the success of the editorial critique is the focus of this chapter. "Success" is measured in terms of the degree to which the aims and validation components of editorial criticism have been met. Both are discussed within the framework of a series of question and answer statements.

Aims of an Editorial Critique and the Editorial Critique of

Sunship Earth

The success of the editorial critique is assessed first by the degree to which the general aims of editorial criticism, outlined by Werner (1980), have been achieved. These three aims are listed and then restated as questions put to the critique of Sunship Earth. An editorial critique

1. ... aims to uncover the underlying perspectives
    embodied in curricular phenomena, their "deep
    structures" that often remain hidden ...
            (Werner, 1980, p. 148)

2. ... aims to uncover the underlying relationships
    between the document and its social context ...
            (Werner, 1980, p. 148)

3. ... seeks to determine the possible implications that
    these underlying perspectives and relations have for
    the classroom.
            (Werner, 1980, p. 149)

Aim 1: Does this critique reveal the underlying perspectives of

        natural systems presented in the curriculum material,

        Sunship Earth?

The underlying perspectives are presented as descriptions of the author's "intended" and "operationalized" views of natural systems. Derived from the design and suggested components of the Sunship Earth

program, these views are made explicit by compiling the author's choice of metaphors, analogies, descriptive phrases, suggested student and teacher roles, rational statements and program format.

The author's intended view focuses on the dualism of the man-nature relationship and the holistic and ecological properties of natural systems. A basic premise is that man must gain a holistic perspective of his "place" in natural systems and the cosmos. Acquiring a sense of the harmony and rhythm of natural systems, as well as the ability to ecologically conceptualize biotic interrelationships, in individuals will require a sense of oneness and unity with nature. This "knowledge" of natural systems will require "mind" and "body" involvement in the learning process. The resulting natural awareness spawns a self-awareness, promoting individual growth and "appropriate" life style choices.

The author's operationalized view also focuses on the man-nature dualism, holistic and ecological properties and the establishment of individual natural awareness. Solitude and sensory experiences encourage new sensory perspectives of natural systems. Conceptualization of ecological principles further aims to focus on holistic properties, however, the emphasis of the activities relies on an egocentric and social-context laden format to make "concrete" those ideas believed to be too "abstract". Ecological principles, viewed through social analogies, are used as the informational framework for making life-style changes.

Aim 2: Does this critique reveal the underlying relationships between the views of natural systems expressed in the Sunship Earth material and the social context of the document?

Van Matre's work, including Acclimatization (1972) and Acclimatizing (1974) can be associated with the early environmental movement and concerns of environmental education. The acclimatization approach and the Sunship Earth program arise from the environmental concerns that man must gain an holistic sense of place within natural systems. Both the early environmental movement and environmental education focus on the issue of altering the "frontier" man-nature dualism, as well as integrating holistic and ecological properties into the conceptualization of natural systems. Further, both view this alteration, or "new" natural awareness, as requiring reconceptualization at the individual level. Van Matre and his co-workers clearly emphasize these views in the rationale and design of their work.

The combination of characteristics summarized for the author's intended view and for the author's operationalized view placed each within a particular subgroup of the heterogeneous environmental movement. The author's intended view reflected an extreme ecocentric perspective typical of the "deep ecology" movement. The operationalized view reflected a shift in perspective toward the technocentric approach to environmental issues. Incorporation of an

anthropocentric student view, a technological metaphor and suggestions for life-style changes, along with the ecological, sensory awareness and solitude components, constructed a view of man's natural systems in line with ecological/scientific environmentalism.

Van Matre's work also reflects the concerns of environmental educators in the construction of environmental study programs. Several of the learning and contextual components incorporated by Van Matre are elements discussed sufficiently by environmental educators (from 1968 to 1979) to be considered as key curricular elements by Hart (1979). This includes incorporation of ecological and holistic conceptualization, active student involvement, promotion of self-actualization, outdoor sensory experiences, and incorporation of environmental issues.

<u>Aim 3</u>:   What are the possible implications that these underlying perspectives of natural systems and their relationship with their social context have for the classroom?

The underlying perspectives of natural systems, and their relationship with the social context, influences the view of natural systems which is structured into the framework of the curriculum material. This framework structures the learning activities of the classroom, outlining the elements and processes important for conceptualization.

In _Sunship Earth_, the underlying perspectives were drawn from the environmental movement and environmental education, emphasizing holistic and ecological principles, individual "active" participation (affective and cognitive), systems thinking and conceptualization of man's place in the "universe". However, reviewing the sources of these elements showed that the meaning and implications of each can vary depending on the perspective taken toward the element. In other words, each element can take on a variety of forms, depending on the framework in which it is viewed or presented.

For example, in the _Sunship Earth_ program, Van Matre focuses on the man-nature interrelationship, the forms of which are one source of the heterogeneity of the environmental movement. Van Matre presents two views: one reflective of the deep ecology movement and the other reflective of the ecological/scientific environmentalism. Within the program, then, two forms of this element make up the program core: one form asking for fundamental ethical and epistemological changes, the other suggesting "slight" technological and life-style alterations within the current socioeconomic framework. The former perspective is inherent in the intended view while the latter _arises_ in the integration and operationalization of the key program elements utilized, presumably, to develop the intended view.

Another example of the various forms of these elements and the effect of context on their expression is apparent when considering the "holistic" element. Van Matre works with holism through the

integration of sensory awareness activities and ecological principles

fueling the conceptualization process. These activities and

principles appear to move toward opening sensory doors for

reconceptualization of "holistic" properties of natural systems.

Coupled with the technical metaphor and egocentric assimilation

activities, however, the element of holism in natural systems shifts

to a cultural perspective rather than an optimum value as suggested

through its association with the sensory awareness component and the

intended view. The shift required by the student is from one of

"sensing" nature's harmony and balance (timing) in an ecocentric

manner to "experiencing" ecosystem connections from an egocentric

(cultural or personal) perspective.

Thus, the view of natural systems described by environmentalists

and environmental educators (and utilized by Van Matre and other

curriculum developers) consists of several "integrated"

characteristics or elements. Each element can be perceived in

different forms and further, can take on these different forms

depending on the context in which it is utilized or presented. Thus

the possibility exists, for example, to present an "intended view" of

"holism" in a fragmented manner. It becomes necessary to focus, not

only on the element in isolation, but also on its form when associated

with other selected "elements" of a program. In terms of Van Matre's

Sunship Earth the juxtaposition of the sensory awareness activity and

ecological perspectives with the technical metaphor and assimilation

activities may shift the conceptualization of natural systems to a framework not initially intended.

The view of natural systems, as described by environmentalists and environmental educators, incorporates specific elements considered appropriate to obtain an "environmentally sound" picture of the nature of the biosphere. Environmental educators work at incorporating these elements into curricula. Curriculum development, structuring the elements of a program, sets the framework for conceptualization of natural systems in this case. What are the characteristics of these elements which ensure an environmentally sound understanding of natural systems? How should these elements be associated with one another to ensure the presentation of a view consistent with the original reasons for choosing the elements? Are "incorrect" associations those which lead to views of natural systems which are not compatible with the views promoted by environmentalists and/or environmental educators?

These questions direct attention to the pattern of the elements which structure the framework for conceptualization of natural systems. This may enable a clearer perspective of what is being presented and enable positive growth toward a desired goal. Are the key environmental education elements being presented within a "frontier" conceptual framework?

<u>Validity Testing and the Editorial Critique of Sunship Earth</u>

The "success" of an editorial critique also rests with the degree to which it addresses the validation principles outlined by Werner (1980). Several aspects of these principles rely on an assessment of internal consistency and of external validation beyond the scope of the critic working alone. Consideration of the validation principles is thus incomplete. Each validation principle is listed, restated as a question(s) and addressed in some degree. Basically, the questions provide the framework for determining the usefulness and continuing validation of this critique. The validation principles are

1. ... the critic must make explicit the <u>methodological</u> <u>framework and purpose</u>
      (Werner, 1980, p. 150)

2. ... the critic [must] open the criticism to public dialogue
      (Werner, 1980, p. 151)

3. ... the validity of criticism depends ... upon its <u>contribution</u> <u>to</u> <u>better</u> <u>understanding</u> the curriculum
      (Werner, 1980, p. 151)

<u>Validation Principle 1</u>: Is the purpose and methodological framework

of this critique explicitly stated?

The purpose of this critique (to describe the view of natural systems presented in <u>Sunship Earth</u> curriculum materials) served as the critical question. It was the guide in summarizing the "background"

context of _Sunship Earth_ as well as outlining and completing the analysis of the program.

The methodological framework of the critique is outlined and explained in Chapter 3. It is also discussed in the body of the critique where appropriate.

Validation Principle 2: Does the response of "the public" to the
critical framework, problem and purpose clarify the limitations
and/or validate the generalizations?

Werner outlines two means of meeting the "public dialogue" component of editorial criticism: (1) "debate openly" the framework and components of the critique; and/or (2) obtain comments from users and/or the developers. Due to time limitations, the "public dialogue" component is limited to the comments of one "user" of Van Matre's work. Further responses need to be obtained to complete the assessment of the critique as well as ensure it dues not stand merely as an "indulgence of the critic".

The comments of the "user", Elizabeth Kennedy, are presented in Appendix D.

<u>Validation Principle 3:</u> Werner addresses this principle through the following questions: Are the critical claims internally consistent and do they fit the curriculum under question? Are there supporting and mutually confirming data presented to back up the claims? Do the claims have some power for guiding our activities for generating new understanding that were impossible before? (Werner, 1980, p. 152).

This validation principle calls for an evaluation of the validity of the claims made in the critique as well as of their ability to provide insight in bringing about directional change. As the critic I can deal with this validation principle only by making the following judgements clear:

a. Van Matre's work seems to have arisen in response to the concerns of environmentalists and environmental educators. The combination of elements brought together by Van Matre and his co-workers were "assembled" in a non-traditional manner. Most striking is the role of the sensory awareness component and the focus on the development of natural, and hence self-, awareness.

b. The transition from the "sensory awareness" activities
    to the closing ceremony of the _Sunship Earth_ program
    have been a source of considerable dissonance for me.
    Prior to this critique, articulation of the source of
    the dissonance was not possible. Two other attempts at
    an analysis of Van Matre's work were completed
    (analysis of the "value pattern" and an assessment of
    the work as representative of environmental education).
    Neither of these approaches revealed anything that was
    not already apparent.

c. The criticism of the _Sunship Earth_ program is _not_
    merely based on an inconsistency between Van Matre's
    intended and operationalized views. Considered within
    its social context, the inconsistencies are
    representative of the diverse views toward each element
    focused on by both the environmental and environmental
    education movements. These diverse forms of the
    elements contribute to the heterogeneity of the
    environmental and environmental education movement and
    it is this heterogeneity which is reflected in Van
    Matre's work.

d. The critical claims emphasized the need to clarify the

meaning of certain "necessary" environmental education

elements and their degree of "flexibility" when

presented in different contexts. The organizational

framework of the curriculum guides not only the

activities but also sets the stage for operationaliza-

tion and conceptualization of the elements (and

combination of elements) required to understand natural

systems.

In summary, this critique should be viewed in terms of its

ability to aid in the shift from a "frontier" view of natural systems

to one closer to the actual nature of natural systems. Biological

growth and development proceeds through increasing hierarchical levels

of complexity. Each level shows specific properties and interactions

which act as a context for the "lower" levels and an element of

information for the next higher level of complexity. In this sense

Van Matre's work represents a pulling together of "environmental"

elements and creation of a new pattern (or level) in development of

curricula to introduce students to natural systems. Continued growth

in curricular development is ensured and directed by considering the

type and source of the concepts presented in the framework of the

curriculum material.

APPENDIX A

Supporting References for Major Categories of
Conceptualization of Natural Systems by Environmentalists

Category 1: The Dualism of Man-Nature

> What people do about their ecology depends on what
> they think about themselves in relation to things
> about them. (White, 1967, p. 19)

References

Key elements emphasized in terms of man-nature relationship

Published Books Author/Year	Problem	Alternative View Suggested
Carson (1962)	Attitudes: Exploits of nature Arrogance, domineering	Man part of "web of life"
Ehrlich (1968)	Attitude: Arrogance, exploiters of nature	Man part of ecosystem
McHarg (1969)	Attitudes: Anthropocentric view Man apart from nature Subdue earth exploitation	Rediscover nature's corollary of the unknown in the self, the source of meaning (seek unity; harmony)
Darling (1970)	Attitudes: Man dominant; exploitive	Ethics of a wholeness of life and responsibility for environment
Ehrlich & Ehrlich (1970)	Attitude: Arrogance, exploiters of nature	All living things part of ecosystem -- including man.
Fuller (1970)	Attitudes: Specialization - Shortsightedness	View nature in terms of systems
McHale (1970)	Attitudes: No regard for intricacy of ecological balances	Turn to ecology to rethink overall relationship between man and environment

References

| Published Books Author/Year | Key elements emphasized in terms of man-nature relationship | |
	Problem	Alternative View Suggested
Commoner (1971)	Attitude: Separate, unrelated existence/ no dependence on natural systems	Everything is connected to everything else; Web of life; closing the circle of life
Falk (1971)	Attitude: Separate from; exploitation of ... nature	Incorporate man-in-nature into essence "ecological imperative" basis of new ethics
Detwyler (1971)	Attitude: Ignorant of his impact	Man-nature relationship must be rethought
Caldwell (1971)	Attitude: Man an "unecological" animal - separation from nature (anthropocentric behaviour)	"Fundamental personality changes, interdependence/ connections (limitations; cyclic nature)
Meadows, et al. (1972)	Attitude: Alienated, fragmented	Basic of model/man is component of complex system
Schumacher (1973)	Attitude: Outside force to nature destined to dominate and conquer "battle"	Live with nature
Blackstone, W. (1974)	Attitude/Values: Exploit; ignore future	Develop "ecological attitude; ethic
Kozlovsky (1974)	Attitude: Ignorance "crisis of identity"	Must acquire naturalistic philosophy (evolution; ecology), part of "living fabric"
Odum, E. (1974)	Lack of ethics/ Quantitative growth	Environmental ethic/ quality maintenance

References

	Key elements emphasized in terms of man-nature relationship	
Published Books Author/Year	Problem	Alternative View Suggested
Passmore (1974)	Ignoring others	Attend to ethics which exist
Perelman, L. (1976)	Attitudes: Roots of crisis epistemological	"Global mind" (holistic thinking)
Lovins, A. (1977)	Human fallibility, malice and irrationality	depend on "carefully designed natural systems and cycles" about which we know next to nothing
Ashby, E. (1978)	Attitude: Exploitation of nature	Symbiosis with nature/ environmentalism
Cahn (1978)	Attitudes: Ignorance arrogance; dominate	Environmental ethic
Roszak, T. (1978)	Nature exploited proletariot/power over nature unnecessary	Nature must also have its natural rights/Make peace with Gaia - nature is also us
Fritsch (1980)	Dualism of man and nature/unlimited resources	Environmental ethic
Peccei, A. (1981)	Have lost sense of whole; interrelatedness	Relationship with biosphere on a new basis Evoke "consciousness of the species"

Articles

Leopold (1949)		land ethic
Boulding (1966)	Attitude: Cowboy (ethic) frontier view	spaceman ethic

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References

| | Key elements emphasized in terms of man-nature relationship | |
Articles Author/Year	Problem	Alternative View Suggested
White (1967)	<u>Attitude</u>: Exploiter/ dualism (anthropocentric)	Man-nature relationship must be rethought
Hardin (1968)	<u>Attitude</u>: Freedom to commons or frontier attitude	Responsibility before freedom
Shepard (1969)	<u>View</u>: Self as arrangement of organs, feelings and thoughts (emphasize integrity)	Self as center of organization, constantly drawing on and influencing the senses (ecological thinking)
Lovelock & Epton (1975)	<u>View</u>: Apart from natural systems	Gaia

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<u>Category 2</u>: Illimitable (Open) Earth vs Finite (Closed) Earth

<u>References</u> describing this aspect of natural systems in terms of
environmental problems

<u>Published Books/Author (Year)</u>   <u>Article/Author (Year)</u>

Carson, R. (1962)   Boulding, K. (1966)
Ehrlich (1968)
Ehrlich, P. and Ehrlich, A. (1970)
Fuller, B. (1970)
Falk, R. (1971)
Caldwell, L. (1972)
Editors of the Ecologist (1972)
Meadows, et al. (1972)
Schumacher (1973)
Perelmann (1976)
Lovins, A. (1977)
Fritsch (1980)
Peccei, A. (1981)

Category 3:   The Reductionist vs Systems View

Published Books/Author (Year)	Article/Author (Year)
Carson, R. (1962)	Bernardi (1970)
Darling, F. (1970)	
Fuller, B. (1970)	
Commoner, B. (1971)	
Detwyler (1971)	
Caldwell (1972)	
Editors of the Ecologist (1972)	
Laszlo, E. (1972)	
Meadows, et al. (1972)	
Odum, E. (1974)	
Perelman (1976)	
Metcalf (1977)	
Ashley, E. (1978)	
Roszak, T. (1978)	
Peccei, A. (1981)	

Category 4:   A View of Self-regulating Properties of Natural Systems

Published Books/Author (Year)

Carson, R. (1962)
Caldwell (1972)
Editors of The Ecologist (1972)
Meadows, et al. (1972)
Blackstone, W. (1974)
Odum, E. (1974)
Tinbergen, T. (1976)
Peccei, A. (1981)

Category 5:   A View of Optimum Values in Natural Systems

Published Books/Author (Year)

Ehrlich, P. & Ehrlich, A. (1970)
Detweyler, T. (1971)
Editors of The Ecologist (1972)
Meadows, et al. (1972)

Category 6: A View of Complexity and Stability in Natural Systems

Published Books/Author (Year)   Articles/Author (Year)

Darling, F. (1970)   Shepard, P. (1969)
Ehrlich, P. & Ehrlich, A. (1970)   Bates, M. (1970)
Detwyler, T. (1971)
Editors of The Ecologist (1972)
Meadows, et al. (1972)
Blackstone, W. (1974)
Roszak, T. (1978)
Peccei, A. (1981)

APPENDIX B

Citation Index Data and Citation in Review Articles

References	Number of times cited as indicated in Social Studies Citation Index			Citation in Review Articles 1980 1977 1981 1980 1980 1980					
	66-70	71-75	76-80	#1	#2	#3	#4	#5	#6

Books

Author (Year)

References	66-70	71-75	76-80	#1	#2	#3	#4	#5	#6
Leopold, A. (1949)	10	33	61	*	*	*	*		*
Carson, R. (1962)	47	56	70				*		
Ehrlich, P. (1968)		97	52	*	*	*	*	*	
McHarvey, I. (1969)	10	52	53	*		*	*		
Benarde, M. (1970)	3	3	-			*			
Darling, F. (1970)	2	4	3			*	*		
DeBall, G. (1970)	9	18	9	*					
Ehrlich, P. & Ehrlich, A. (1970)		129	64		*	*	*	*	
Fuller, R. B. (1970)	2	19	20		*				
Love, G. & Love, R. (1970)	-	3	-						
McHale, J. (1970)		10	5					*	
Commoner, B. (1971)		129	128	*	*	*	*	*	
Falk, R. A. (1971)		49	45			*			
Detwyler, T. R. (1971)		11	2			*			
Caldwell, L. K. (1972)		11	7			*			
Editors of the Ecologists (1972) (Goldsmith, et al.)		24	38	*	*	*	*	*	
Laszlo, F. (1972)		20	30		*				
Meadows, et al. (1972)		203	387	*	*	*	*	*	
Ehrlich, et al. (1973)		6	11						

| References | Number of times cited as indicated in Social Studies Citation Index | | | Citation in Review Articles | | | | | |
	66-70	71-75	76-80	1980 #1	1977 #2	1981 #3	1980 #4	1980 #5	1980 #6
Schumacher (1973)		30	310	*		*		*	*
Blackstone, W. (1974)		4	6						
Kozlovsky, D. (1974)		-	-						
Mesarovic, M. & Pastel, E. (1974)		21	185	*		*			
Odum, E. (1974)		4	6						
Passmore, J. (1974)		13	35	*		*	-	*	
Perelman, L. (1976)			6						
Tinbergen, J. (1976)			102						
Hardin, G. & Baden, J. (1977)			32	*	+	*	*		
Laszko, E. (1977)			22		+		*		
Lovins, A. (1977)			105	*	+			*	*
Brower, D. (1977)			1		+				
Ashby, E. (1978)			1		+				
Cahn, E. (1978)			5	*	+	*			
Roszak, T. (1978)			10	*	+				
Miller, G. H. (1978)			6	*	+				
Fritsch (1980)			-		+				
Peccei, A. (1981)			-		+				

Articles

References	66-70	71-75	76-80	#1	#2	#3	#4	#5	#6
Boulding, K. (1966)	9	39	51		*	*	*	*	
White, L. (1967)	17	39	40	*	*	*	*	*	
Leach, E. (1967)	7	2	3						
Hardin, G. (1968)	31	130	205		*	*	*	*	
Shepard, P. (1969)	12	23	9	*					*
Ehrlich, P. (1970)		2	2						
Bates, M. (1970)		-	-						
Lovelock, T. & Epton, S. (1975)		1	3	*					

Review Articles/Books

#1 Devall, Bill. (1980). "The Deep Ecology Movement", paper in
        symposium "Whither Environmentalism". Natural Resources
        Journal, 201, 299-322.

#2 Metcalf, W. J. (1977). The Environmental Crisis: A Systems
        Approach. University of Queensland Press, St. Lucia,
        Queensland.

#3 O'Riordan, T. (1981). "The Evolution of Modern Environmentalism"
        in Environmentalism: Second Edition. O'Riordan, T. Pion
        Limited, Brondesbury Park, London.

#4 Passmore, J. (1980). Man's Responsibility for Nature:
        Ecological Problems and Western Traditions. Unwin Brothers
        Limited. Second Edition. The Gresham Press, Surrey, England.

#5 Sandback, F. (1980). "The Environmental Movement" in Environment
        Ideology and Policy. Sandback, F. author. Basil Blackwell
        Publisher, Oxford, England.

#6 Schnaiberg, Allan. (1980). "The Environmental Movement: Roots
        and Transformations" in The Environment, Oxford University
        Press, Inc., Oxford, England.

APPENDIX C

Tables of Quotes Describing Natural Systems
in Statements of Aim and Rationale

226.

Table I

Man and Nature: Quotes from _Acclimatization_ (1972),
Acclimatizing (1974), and _Sunship Earth_ (1979)
Describing the "Current" View of Natural Systems

from _Acclimatization_ (1972)	
Letter	Quote
IA	Camping movement ... identification - collection - experimentation and exploration, identification ... teach "nature study" by asking the student to commit to memory the name of everything within reach. (7)
IB	collection ... great masses of material were accumulated in innumerable thousands of grimy palms groped, and force, and mutilated... (7)
IC	experimentation ... apply the "scientific method" to one's finds... (7)
ID	exploration ... the group could tramp around the local pond on some cold fall morning, thus escaping the environments of the classroom, but invariably this was only a contrived respite. (8)
IE	Facing an ecological crisis ... we (camp nature programs) attempted to convey ecological understandings by a greater dosage of that which had already proved demonstrably unenduring. (9)
IF	The new approach is based on an explicit assumption about the modern adult and his offspring; man has cut himself off from nature. (17)
IG	He watches it [nature] but keeps himself separate from it. He is viewer rather than participant ... he cannot really understand his natural surroundings. (17)

from _Acclimatization_ (1972)	
Letter	Quote
IH	... accustomed to his comfortably detached relationship... (17)
II	Other firmly implanted attitudes also hinder him; fears of insects, an obsessive urge to plunder rather than experience and even the fear that he might be ridiculed. (17)

from _Acclimatizing_ (1974)	
Letter	Quote
IJ	I believe natural resources are not things, but communities. (10)
IK	It is not the lumber, but the forest which represents the true natural resources. If we could but change an entire nation's concept of resources, we might change our self-consumptive approach to this rather magnificent yet imperilled sunship. (10)
IL	Man's natural resources are not individual things, but whole communities, even though their components may resemble the resources of yesteryear. (10)
IM	... one cannot destroy the giver in the process of sharing the gifts. It's the ubiquitous goose of the fables... (10)
IN	To allow the incessant destruction of these communities is to destroy the taproot of our existence. (10)
IO	There is a malaise upon the land. The film of life ... has given birth to a parasitic species of intensive destructive capabilities. (10)

from _Acclimatizing_ (1974)	
Letter	Quote
IP	... man may well perform the heretofore ecologically unthinkable act: either to consume his own community -- or to foul his own quarters or to make living there untenable. (10)
IQ	Is there any hope of reversing the onslaught in the future? (10)
IR	... it can turn us into walking corpses. (A state we appear to pursue with some diligence as we continue to ... verbalize, but do not feel; think instead of doing; become anesthetized rather then sensitized to our surroundings; and to isolate ourselves from our natural origins. (12)
IS	"tripping program" -- other fosters an artificial detachment. An unhealthy duality: mind OVER body and OVER nature ... traditional comparative activities, survival training and physical ordeals relegated to an adjunct level at best... (12)
IT	To put your energies against nature is to do battle with yourself. (12)
IU	Remember: this voice deals with abstractions. Its words are not the things themselves. (14)
IV	Man may well be doomed as a viable species unless he can awaken his natural voices and his capacity to genuinely listen to the voices of nature. (19)
IW	Urban life mutilates against natural awareness. There are just too many obstacles, too many man-created barriers to overcome in the city ... chances of receiving a genuine message from the natural world are slim ... To experience nature we must ... literally, get out of the nest. (19)
IX	... important to feel the natural channels of human energy (gathering food, making bread) that we have broken away from so abruptly since the Industrial revolution ... experience the joy and harmony of some of the primitive ways... (151)

Letter	Quote
	from _Sunship Earth_ (1979)
IY	For those of us who live in cities, the source of food, the importance of soil and the cyclical nature of fresh water have become textbook concepts which seem to have little direct impact upon our lives. (xvii)
IZ	... city dweller isolation... (xvii)
Ia	... have lost sight of and thus have lost the understanding of and feelings for -- ... the natural processes upon which we ultimately depend. (xvii)
Ib	Cities ... dominate perceptual fields ... lead them to believe that cities do ... dominate the unseen processes which support them
Ic	... immensity and seeming permanence ... tends to instill ... a distorted perception ... view green contours and fresh streams as ancient shadows, without substance or meaning, without value to our future. (xvii)
Id	... our omnipotence is a myth, our omniscience a delusion. (3)
Ie	people who could take life apart but cared nothing for keeping it... (4)
Ig	... concepts about life embody pragmatic warnings about the places and things around them... (7) e.g. NICE vs BAD ...
	... these concepts ... formed ... by the whole cultural milieu in which they live. (7)
Ih	...MIS-conceptions about what the world is like.
Ii	... gain knowledge by adding to their stock of facts day by day ... senses overlumped together in one homogenized mass. (8)

from <u>Sunship Earth</u> (1979)	
Letter	Quote
Ij	... kids encouraged to believe that they should not trust their own perception ... told to be objective, disregard emotions and feelings and experiment to find the truth... (8)
Ik	The human species is neither the omnipotent conqueror nor the omniscient steward of the natural world. (11)
Il	Naming is not Nature ... In figuring out the order of the world we must not believe that it becomes what we have named it. The world exists; it spins through space regardless of our attempts to unlock its secrets.
Im	... problem is that once we name something we frequently tend to stop thinking about it... something taken for granted ... we often tend to stop thinking about what we can name and miss seeing what we cannot name! (29)

Table II

Man and Nature: Quotes from Acclimatization (1972),
Acclimatizing (1974), and Sunship Earth (1979)
Describing the Sense in "A Sense of Place"

from Acclimatization (1972)	
Letter	Quote
IIA	...convey appreciation and feelings for the natural world ... convey such deep and abiding love... (9)
IIB	...sensitize the individual to his environment. (10)
IIC	let's help him to "feel" the out-of-doors.... Quite literally to "absorb" its various moods. (10)
IID	... the camper should come to "feel" his environment. To draw it close to him. To love it. To understand it ... as an intrinsic part of himself. (11)
IIE	... process of coming to understand, and by so doing to feel at home with, the natural surroundings -- to familiarize, sensitize, naturalize, harmonize. (18)
IIF	... person must "feel" something about his environment before he will truly undertake to live in harmony with it. (102)

from Acclimatizing (1974)	
Letter	Quote
IIG	... our intention to promote unifying experiences ... Our format emphasizes individual awareness and sensitivity ... time for natural observation and personal expression ... to instill a natural openness for unitive and reflective growth -- "a heart that watches and receives". (12)
IIH	The key to healthy growth is "individual awareness" ... I feel that self-awareness follows NATURAL AWARENESS.

from _Acclimatizing_ (1974)	
Letter	Quote
III	It is important for young persons to see the exquisite lines, the interrelatedness, the formidability yet fragility of all life; to see the patterns, the delicate harmony and the balance of all living things. "Thou canst not stir a flower without troubling of a star". (19)
IIJ	... to instill a spirit of joie de vivre ... aim to create a breathless sense of excitement, and wonder and love for life.
IIK	A small child enters totally into that world. There is no inner and outer dimension. There is no analysis or consciousness of time or withholding of self. What there is in the child's mind is the joy of play and the total giving of self to the moment ... to pursue awareness until we return to that childlike innocence and harmony -- only on a higher level. (18) To achieve ... "you are not your hand" "listen to natural voices" "go outside"
IIL	... running through these "keys" (exercises outlined in the book) ... you can reach a crescendo of emotion, or ... can achieve a feeling of oneness unmatched by other experiences ... this keyboard will aid ... in becoming supremely tuned to the rhythms of the cosmos. (20)
IIM	stopping to take time to really absorb a scene and to get in touch with the essence of a particular place ... (160)
IIN	Ecstasy. Losing self-consciousness in a total absorption in Nature. (167)
IIO	... becoming one with nature, flowing easily and living simply and honestly within the environment (208)

	from <u>Sunship Earth</u> (1979)
Letter	Quote
IIP	like a surveyor, we wanted to cast a point of reference for each of our learners -- to convey something about their place in universe. (xvi)
IIQ	hoped to establish this sense of place forever in their understanding .. in their <u>feelings</u>, for we wanted it to become embedded inside them, where it would be a continued source of awareness about who and where they were. (xvi)
IIR	... hoped that this recognition of miraculous interrelationship would become a mental touchstone ... (xvii)
IIS	... program would provide an overall view of man's place in space and what that means for each of us. (xvii)
IIT	(1) ... to feel at home with the natural world (2) to be aware of the ecological processes which govern life and to understand one's role as a part of those processes ... build a sense of relationship ... with the natural world. (5)
IIU	... recognize natural communities as their preeminent homes, to re-accustom themselves to the natural heritage we all share. (5)
IIV	... feeling a kinship with all living things. (6)
IIW	... promotes understanding, but an understanding that eventually transcends knowing. (6)
IIX	... every action will be played out against this backdrop of who and where we are. (4)
IIY	... A key facet of healthy growth is the understanding that self-awareness is increased through natural awareness. (11)

Table III

Man and Nature: Quotes from _Acclimatization_ (1972),
Acclimatizing (1974), and _Sunship Earth_ (1979)
Describing the _Place_ in "A Sense of Place"

from _Acclimatization_ (1972)	
Letter	Quote
IIIA	... he must re-establish a unity with nature by breaking down the barriers, physical and attitudinal, which he has created. (17)
IIIB	... a breaking down of the barriers to the point where one human being can feel himself not only completely surrounded by his environment, but totally involved with it as well. (17)
IIIC	... Once he has felt this unity with Nature, he is more hesitant to destroy here; he realizes that to do so would be to destroy himself. (17)
IIID	... stimulate the deepest kind of identification with Earth itself -- the patterns of life and man's role therein... (22)
IIIE	... a time where we can come to grips with ourselves as a small part of an immense world. (73)
IIIF	...camp [200] ... -- a place where one can investigate the characteristics and patterns of the animal kingdom and thus man's interrelatedness with all life. (75)
IIIG	.... overall atmosphere created is one of immersion in nature -- almost baptismal in effect -- ... (103)

from _Acclimatizing_ (1974)	
Letter	Quote
IIIH	... help young people learn about themselves, not as isolated entities, but each one as a colescence in the sun's web of life. (9)
IIII	... second we must strive to merge with the environment, not overcome it ... To pit your energies against nature is to do battle with yourself.... should be a ready-made vehicle for conscious and considered mind/body involvement in the natural world
IIIJ	... promote unifying experiences. (12)
IIIK	Everything goes somewhere. You can't do just one thing. Everything has a home. Everything has its own sound. (15 & 19)
IIIL	For hundreds of thousands of years nature has been bringing forth life in beautiful, revised and increasingly complex manifestations ... You are a highly tuned organism standing at the present pinnacle of that development ... (18)
IIIM	"You are a piece of the sun." (18)
IIIN	Energy flows from the sun. It bathes the surface of this whirling mass. It gives life. You are part of that flow ... a piece of the sun ... a tiny warm speck of life ... Bask in the natural elements and the natural rhythms. (57)
IIIO	Learning to live with nature and living with nature in order to learn what we set out to do at the ESS. (93)
IIIP	They go in order to live _with_ nature, not merely _in_ nature ... living with nature and learning about nature's ways and one's own ... closer to nature and closer to himself. (132)

from <u>Sunship Earth</u> (1979)	
Letter	Quote
IIIQ	... systems in which they are bound up with every other living thing on earth. (xvi)
IIIR	... a continuing commitment to live in harmony with earth. (xvix)
IIIS	Who are we? Like all other forms of life on earth, we are sparks of organized energy. (3)
IIIT	Sunlight, air, water, soil and plants -- man's brief existence depends on these (3)
IIIU	... our tissues will become the tissues of other plants and animals... (3)
IIIV	alert to the rhythms of the earth ... attuned to its natural harmony and flow... (4)
IIIW	... sense our eternal relationship with Sunship Earth. (4)
IIIX	... appreciate nature for what it represents -- that tightly woven fabric which supports them to which they, in turn, contribute. (7)
IIIY	... every action they take has a direct impact upon those natural systems. (7)
IIIZ	... refreshes our sense of harmony with the world around us. Living <u>in</u> a more natural environment should be undertaken primarily for ... (11)
IIIa	Because of the interrelatedness of all life, our focus should be upon activities which promote harmony instead of those which encourage a sense of power. (11)
IIIb	... borrowing from the Indian an appreciation for moving along among the plants and animals without advertising one's presence ... want to bring individual into a definite, intimate relationships with a part of the environment. (151)

from <u>Sunship Earth</u> (1979)	
Letter	Quote
IIIc	try to see YOURSELF as fitting into the unity of nature. To become one with the natural world is not just to see the wholeness. It is to BE, to recognize one's place in that whole -- to stand as a brother with the stones and tress. (167)
IIId	For man IS a part of nature; pitting himself against his environment is but an act of egotistical folly. Man can never really "overcome nature, because he cannot overcome himself. For better that he seek his rightful place within the harmony, the ongoing life of the natural world. (208)
IIIe	... IT is only because we view ourselves as something apart that we feel threatened. (208)
IIIf	confrontation not between man and nature but between man and his sense of identify ... struggle with the deepest questions of existence...
IIIg	Finding one's self and finding nature, becomes, in the sense, the same search. (208)

Table IV

Quotes, Descriptive Phrases and Terms from Acclimatization
(1972), Acclimatizing (1974) and Sunship Earth (1979)
Describing the Natural Environment

from Acclimatization (1972)	
Letter	Quote

IVA	[An epigraph the acclimatization group developed]
	
	The Web of Life
	
	Light, air, water and soil are the elements
	      of life,
	
	Life is divided into producers, consumers
	      and decomposers,
	
	Everything is becoming something else.
	
	      Everything has a home,
	
	Homes in a defined area form a
	      community,
	
	Inhabitants of these communities live
	    together in competition, cooperation or
	    neutrality;
	
	Man is the chief predator.
	
	      (pg. 5, 18)

IVB	learned that a sense of the inter-relatedness of life, a respect for the wholeness of the environment, cannot be conveyed piecemeal by the dissection of its past. (9)
IVC	nature possesses exquisite beauty; that she is fragile; yet formidable; delicate yet omnipotent; but all the same inevitably responds to human touch. (12)
IVD	Seek the arrangement of life in pattern, harmony, color, interaction, variety, etc. (21)

from _Acclimatization_ (1972)	
Letter	Quote
IVE	... web of life... (73)
IVF	... singleness yet vast complexity of all life. (83)

from _Acclimatizing_ (1974)	
Letter	Quote
IVG	The American Indian was correct in his characterization of "mother earth". (10)
IVH	... since they are inextricably bound up with all 3 of these [habitat... cycle or community] ... (11)
IVI	... explain the interdependence of life.. (11)
IVJ	... the nature of life is nature. (13, 57)
IVK	... we find beauty in natural objects ... see the exquisite lines, the interrelatedness. The formidability, yet fragility of all life; to see the pattern, the delicate harmony and the balance of all living things. "Thou canst not stir a flower without troubling of a star". (14)
IVL	... all things would appear as they are, infinite ... enter a world as potentially rich as the whole of human heritage ... (17)
IVM	For hundreds of thousands of years nature has been bringing forth life in beautiful, varied and increasingly complex manifestations ... (18)
IVN	Listen to natural voices. EVERYTHING has its own sound. Go sit on a rock and listen. (19)
IVO	A tree is not just its trunk and branches and leaves ... It is more than the sum of its parts. A tree IS its surroundings. (43)

from _Acclimatizing_ (1974)	
Letter	Quote
IVP	Each is known only in terms of the other (e.g. space and no space). (44)
IVQ	One crucial concept at core of ESS (meshes easily with both the outdoor living and natural awareness aspects of the plan) ... Web of life -- the inter-relatedness of all things. (93)
IVR	... how the web of life is all around us. (93)
IVS	Wholeness. Everything is connected to everything else; nothing exists in isolation ... "The world IS a whole". We just happen to perceive or focus on one part of it at a time. (167)
IVT	Nature works in cycles. There are no ends and no beginnings ... on and on. (167)
IVU	Rhythms -- flow... rhythms in our life here ... The earth is full of rhythms; so are all the animals. So are we. (189)

from _Sunship Earth_ (1979)	
Letter	Quote
IVV	... positive, long-term respect for life's systems (xvix)
IVW	... see and feel the earth as a not-so-vast interrelated system of energy and materials
IVX	Quote, Gerry Carr ... earth's horizon ... earth's atmosphere ... And it is so thin and fragile ... see the fragility of the earth. (xxi)
IVY	... nature ... that tightly woven fabric...
IVZ	... interlocking relationship of life's systems (3)

Letter	Quote
	from <u>Sunship Earth</u> (1979)
IVa	... rhythms of the earth ... natural harmony and flow... (4)
IVb	... our goal is not pulling apart the insides of the frog, but understanding the frog inside the pond and the pond inside the water cycle. (8)
IVc	Mankind's most important natural resources are not the material things, but the natural communities of life from which those things are taken. (11)
IVd	... natural systems do not operate in a fashion which lend themselves to man's models. (13)
IVe	Naming is not nature ... see the world as an endless list of names condemned us to a rather shallow existence. In figuring out the order of the world we must not believe that it becomes what we have named it. The world exists; it spins through space regardless of our attempts to unlock its secrets. (29)

Terms and phrases descriptive of natural systems taken from the
quotes in Table 1, 2 and 3 of Appendix C.

from Acclimatization (1972)

... natural resources are not individual things, but whole communities
... environment ... intrinsic part of himself
   harmony
   unity with Nature (twice)
   interrelatedness with all life

from Acclimatizing (1974)

   unifying experiences (twice)
   ... exquisite lines, the interrelatedness, the formidability yet
   fragility of all life
   see pattern, delicate harmony and balance of all living things
   feeling of oneness
   tuned to rhythms of the cosmos
   "Thou canst not stir a flower without troubling of a star"
   Everything goes somewhere.
   You can't do just one thing.
   Everything has a home.
   Everything has its own sound.
   life is beautiful, varied and increasingly complex manifestations.
   natural elements and natural rhythms

from Sunship Earth (1979)

... cyclical nature of fresh water
   natural processes upon which we ultimately depend
   Naming is not Nature
   miraculous interrelationships
   ecological processes govern life
   sense of relationship ... with the natural world
   tightly woven fabric which supports and to which they contribute
   natural systems
   harmony (4 times)
   interrelatedness of all life
   rhythms of the earth ... attuned to its natural harmony and flow
   bound up with every other living thing on earth
   unity of nature
   wholeness

APPENDIX D

An Example of "Public Dialogue"

The Editorial Critique of the <u>Sunship Earth</u> curriculum package
was informative and enlightening for me. The selection of this method
as an evaluative tool seems very appropriate considering the nature of
the Sunship Earth program and the initial questions and concerns of
the critic. Delineation of Van Matre's intended and operationalized
view of natural systems was an effective process for systematically
examining the internal consistency of his particular program. It
presented me with an effective framework for re-examining curriculum
materials which I had utilized. The decision to focus upon natural
systems added to the clarity and usefulness of the curricular
evaluation by providing parameters for the evaluation focus rather
than attempting to deal with several possible aspects of an
environmental education curriculum package, and thus remaining too
general or broad. The view of natural systems described/determined by
environmentalists and environmental educators was sufficiently
outlined in Chapter Four to serve as a strategic "backdrop" or
perspective from which to view Van Matre's work. The description of
Van matre's intended and operationalized views in Chapter Five was
very clear, thorough and systematic. The reader came to realize and
appreciate the fact that statements and ideas presented in the main
text discussions were <u>not</u> based on shallow, hasty speculation but

rather were the result of a very extensive, in-depth examination of the curriculum materials. The Tables and Appendices allowed the reader to examine the frameworks and data from which the two views were developed. These aspects contributed generally to the value of the critique for me.

Specific aspects of the critique which I found informative and useful include the following:

- the method used to compile Van Matre's intended view of natural systems and the criteria for classification of the quotes which made explicit the rationale emphasis of _Sunship Earth_, i.e., "a sense of place".

- elaborating upon "a sense of place" (i.e. a particular type of association between the individual and the natural world) by outlining specifically what that _is_ in contemporary society and what that _ought_ to be according to the _Sunship Earth_ authors.

- establishing that Van Matre's intended view of natural systems is focused at an ecological level and is compatible with environmentalists' and environmental educators' views of natural systems.

- establishing that Van matre's intended view of the human-natural system relationship reflects the ecocentric, bioethic (O'Riordan, 1981) and deep ecology (Devall, 1980) perspectives and shares many of their basic premises, e.g. the relationship between an individual's "natural awareness" and appropriate ecological actions.

Tables 5-4, 5-5 and the six items on pages   supported the point
effectively.

- the use of Hart's (1979) curriculum organization framework to
structure the operationalized view (specifically the instructional and
contextual program support elements)

- examining the "sunship" analogy in light of the continuum
developed in Chapter Four (Figure 4-1) and pointing out that the
analogy reflects an egocentric view and ecological/scientific type of
environmentalism

- outlining and examining the five ingredients of acclimatization
individually with respect to the continuum developed in Chapter Four
and Van Matre's intended view. This analysis was most enlightening
for me. It brought organization and clarity to my thoughts and
feelings about the Sunship Earth program. Prior to reading the
Editorial Critique I had experienced mixed reactions to Sunship Earth
but could not pinpoint the reason for my dissonance. My fuzziness of
thought became more clear and focused as I read the data presented to
support the argument that there is a "... shift toward ecological/
scientific environmentalism ... primarily through the sunship earth
metaphor and the assimilation activities designed for ecological
conceptualization". Identification of this shift meant that there was
a discrepancy between Van Matre's intended view and operationalized
view.

- analyzing each of the five "acclimatization ingredients"

facilitates a succinct assessment of the strengths and inconsistencies contained in the operationalized view in light of the intended view. It also suggests areas where users may wish to make changes -- if indeed that is possible to any significant degree considering the broader dilemma this critique suggests.

The discussion of the "magic ingredient" initially left me somewhat puzzled but eventually served as a catalyst for further analysis. It seemed to me from the Summary Table 5-10 that the magic ingredient contained possible contradictions. These contradictions were not discussed explicitly in the main text. Considering the critic's pattern of concise, explicit discussion of the other ingredients I began to wonder if particular aspects of Van Matre's presentation of the magic ingredient may have contributed to the critic's somewhat "tentative" discussion of this ingredient. My next step would be to re-examine that particular section of Sunship Earth in light of the framework and questions I had received from the critique.

I have discussed general and specific aspects of the Editorial Critique that contributed to and enhanced my understanding of Sunship Earth as an environmental education curriculum package. My final remarks will focus on the broader issues/questions that the critique raised for me. Presentation of various perspectives (e.g. ecocentric, bioethical, spaceship earth) and explication of their premises allowed me to identify these perspectives in other environmental education

readings and curriculum materials. It offered another useful
framework from which to view the environmental education literature.
It also assisted me in articulating an issue that I have constantly
struggled with as an environmental educator: Is it a correct
assumption that "natural awareness [is] the route to individual
self-actualization and subsequent movement to 'appropriate ecological
action'"?

Where is the data that supports the belief that natural awareness
leads to appropriate ecological action? There may be other ways to
achieve "appropriate ecological action" which environmental educators
have not and cannot consider because of the assumptions they hold.

Consideration of the critic's concluding questions in Chapter
Five in light of the information and analysis presented in the main
body of the critique raises the dilemma referred to earlier: Can
certain perspectives of natural systems (e.g. deep ecology) be
incorporated and operationalized in our contemporary society and
educational system? Indeed, the critic argues that "... the
fundamental component of achieving unity and 'oneness' and recognizing
harmony and rhythm within natural systems differs at a philosophical/
epistemological level from the idea of 'adjusting' our life styles
within the current cultural context to appropriately interacting with
living systems" (p. 30).

And finally, irregardless of the intended view to which a person
subscribes, internal consistency in curriculum materials with respect

to the developer's intended views and operationalized view becomes a

worthy goal for curriculum developers. Editorial criticism offers

users a method for systematically evaluating curriculum materials for

internal consistency.

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