Educating Ecological Citizens of *The Blue Planet*

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Abstract
This paper explores the implications of a renewed model of citizenship and citizenship education developed on the principles of ecology and ecological interdependence. By reframing our community from a human polity to a biotic community, the scope of our citizenship responsibilities shift. While expanding to encompass a global context, this new vision of citizenship deepens our ability to respond—that is, our "response-abilities"—to relationships excluded by the Western Enlightenment tradition of citizenship. Accordingly, drawing back to the Stoics (via Nussbaum) and even beyond Western civilization to Buddhist concepts of universal responsibility, the author presents a program for global ecological citizenship education based on a renewed global form of liberal education; ecological values and ethics; interdisciplinary inquiry; and reflexive practice within a pedagogy of compassion.

Résumé
Cet article explore les implications d'un modèle renouvelé de citoyenneté et l'éducation de la citoyenneté développée sur les principes de l'écologie et de l'interdépendance écologique. En recadrant notre communauté, à partir d'un régime humain vers une communauté biotique, le champ de nos responsabilités de citoyen change. En même temps qu'elle se développe pour inclure un contexte global, cette nouvelle vision de la citoyenneté renforce notre capacité à être sensible – c'est notre « capacité de réaction » - à cette relation refusée par l'esprit « éclairé de la tradition occidentale » en ce qui concerne la citoyenneté. Par conséquent, reculer jusqu'aux stoïciens (par Nussbaum) et même au delà de la civilisation occidentale jusqu'aux concepts bouddhistes de la responsabilité universelle, l'auteur présente un programme pour une éducation globale, écologique de la citoyenneté et basé sur une forme globale renouvelée d'éducation libérale : des valeurs écologiques et une éthique, une enquête interdisciplinaire et une pratique réflexive dans une pédagogie de compassion.

In most societies, education continues to be asked to fulfill two potentially conflicting responsibilities:

- to serve economic and social reproduction needs, including socializing children, reinforcing norms, and training people in life skills, vocations, and professions; and

- to serve higher, more philosophical or altruistic human needs, including the cultivation of truth and virtue, liberation of the oppressed, and bringing humanity closer to an ideal or divinity by "drawing out" (etymology of "to educate") our innate potential.

These competing expectations have become even more polarized and widespread in the global period, pitting global *economic* citizenship against global *ecological* citizenship in education, or, as Edmund O'Sullivan (2002) provocatively juxtaposed, "The Market or the Planet." As he went on to explain, "the fundamental educational task of our times is to make the choice for a sustainable planetary habitat of interdependent life forms over and against the pathos of the global competitive marketplace" (p. 59).

These two orientations, in turn, are reflected in dominant educational or curricular philosophies, which Hutchison (1998) summarizes as:

- technocratic "back to basics" education,
- progressive "child centred" education, and
- holistic education.

Hutchison argues that neither the technocratic nor progressive philosophy "adequately addresses the fragile state of the planet's life systems or the role of the human within the larger context of the earth community" (p. 56). On this basis, he suggests that "the holistic philosophy is judged to provide the best educational context for dealing with the environmental challenges we face" (p. 56), pointing out that this orientation is inclusive of the other two approaches but larger in scope. In this way, Hutchison (1998) articulates the stance assumed by many environmental educators that holistic education, with its orientation on personal growth and emotional development, is the philosophy most compatible with cultivating an environmental awareness.

As accurate as Hutchison's (1998) critique of citizenship interpreted by Progressivists like Dewey (1916/1966) may be—that is, that it is anthropocentric and focuses obligations on a socio-political rather than ecological context—this does not warrant abandoning the deep roots of the classical liberal tradition's emphasis on citizenship and social responsibility. Without these roots, the holistic tradition becomes translated into educational practices that seem self-indulgent, narcissistic, and preoccupied with personal development and pleasure. Although Hutchison pays lip service to this critique by pointing out the tendency of the holistic educational tradition to glorify the individual as contrary to the interdependent orientation of an enhanced ecological awareness, his critique does not go far enough. In this paper, I argue the need to articulate an alternative approach to education for ecological awareness that does not pit the personal above or in opposition to the political, an approach to redeem the concept of citizenship itself within a more holistic or complex context of our responsibilities as human beings.

In the European education traditions, precedents for a more inclusive form of citizenship education extend back to the classical conceptions of *world citizenship* advocated by the Stoics. As Nussbaum (1997, 2000) points out, conflicts between the economic and humanistic ends of education existed when L. Annaeus Seneca (died AD 65), a leading Stoic philosopher, initially attempted to establish the proper purpose of liberal—*liberalis*— education two millennia ago. This conception of citizenship was incorporated into the traditions of liberal education, which today is identified most directly with secular humanism and the Western traditions, with a focus on the Enlightenment and its conception of liberation through reason. Like Seneca's Rome, Nussbaum suggests, our contemporary world struggles between two radically different interpretations of liberal education—one that is elitist and the other democratic in impulse:

> The older one, dominant in Seneca's Rome, is the idea of an education that is *liberalis*, "fitted for freedom" in the sense that it is aimed at freeborn gentlemen of the propertied classes .... The "new" idea, favoured by Seneca, interprets the word *liberalis* differently. An education is truly "fitted for freedom" only if it is such as to produce free citizens, citizens who are free not because of wealth or birth, but because they can call their minds their own. (p. 293)

This non-elitist vision of education has struggled through time to encompass progressively more individuals and classes of individuals under the scope of its radical egalitarian vision, mirroring the expansion of the ideals and institutions of democracy and human rights. This radical egalitarian vision is culminating today in attempts to examine what "deep citizenship" (Clarke, 1996) might mean if the parameters of our community and responsibilities are understood to go beyond those circumscribed by the anthropocentric polity or economy of a city or state or even globe, to the ultimate cases of a biotic community like the planet Earth or even an interdependent universe. This paper considers the challenges of supporting this shift to deep ecological citizenship through education, and how this agenda can be furthered through:

- an expanded interpretation of liberal education,
- global ecological citizenship,
- stablishing ecologically consistent values and ethics,
- supporting enhanced interdisciplinarity, and
- encouraging more reflexive and more compassionate pedagogical practices.

Liberalis Education in a Global Context

What ecological citizenship education has to gain from classical liberal education is precisely that for which liberalism is most critiqued—namely, its pursuit of a universal ethic and "common" value, or ground for communicating across differences. Insofar as we share a common Earth and biological context, there is justification for such a common code of ethics and education to safeguard that commons. Without a shared value standard to guide global development, underdeveloped communities are susceptible to business and government exploitation. In his discussion of the public intellectual, Said (1994) argues for the centrality of universality under globalization:

> Universality means taking a risk in order to go beyond the easy certainties provided us by our background, language, nationality, which so often shield us from the reality of others. It also means looking for and trying to uphold a single standard for human behaviour when it comes to such matters as foreign and social policy. (p. xiv)

From Seneca's Stoics to Kant's Enlightenment to contemporary times, *liberalis* education has existed in tension with the economic and social outcomes expected of education. Today, education "fitted for freedom" in Seneca's sense is in dire need of rescue from education as professional training and socialization, which focuses on preparing students to occupy particular economic, public, or professional roles. As education becomes increasingly standardized across national and transnational contexts, it needs to cultivate citizens capable of acting responsibly within global, not merely national or local, contexts; to cultivate world citizens capable of engaging in participatory modes of democracy in civil society; and to cultivate, support, and promote our common *global* (i.e., planetary, universal) well-being.

The Progressive tradition of education in the 20th century reinvented many of the earlier liberal education outcomes in a modern context with its emphasis on the power of human reasoning, democracy, and citizenship. The holistic tradition shifted emphasis instead to emotional development, consensus or harmony, and personal growth. Yet, in spite of claiming to be "holistic" by reflecting the panoply of human capabilities and needs, much of this orientation is builds on the naïve idealism of the Romantic, anti-Enlightenment, anti-intellectual educational philosophical traditions of Europe. So, what is the way forward? As Sauvé (1999) pointed out, "The challenge is to find the basis of an education capable of promoting an integral human development, to which environmental education offers an essential contribution" (p. 30). Complementing this challenge is the call for more integrated programs or curricula to stress "the "inters"—interaction, interconnection, interdependence, and interrelationship," which Steen (2003) cautioned is still insufficient to address the mechanistic approach to schooling (p. 199).

One attempt to address these varied calls for a more complex understanding of human development paired with a more integrated approach to curriculum is coming from within the liberal educational tradition itself. Drawing on a cross-cultural approach to human development and education, Nussbaum (1997, 2000) identified certain basic principles of liberal education capable of serving such an expanded world citizenship agenda.

Underpinning these principles is the idea that all human beings share certain rights or *capabilities*, that every citizen of the world should have the opportunity to develop. According to Nussbaum (1997), the basic human capabilities education needs to develop are:

- critical reasoning;
- narrative imagination; and
- world citizenship, criteria which together offer the means to cultivate "humanity" writ large, in both senses of the term (p. 9-10).

The third criterion (i.e., world citizenship) prepares students to participate in the community of humanity.

Although Nussbaum (1997, 2000) draws historically on the classical Stoic notion of *world citizenship*, she grounds the classical idea in examples from contemporary North American and non-Western intercultural educational programmes. This is a crucial link to move from a citizenship education agenda that is little more than a local lineage of the West to a universal basis for global or world citizenship. Intercultural dialogues offer a way to draw on the best of various global citizenship traditions (Kato, 2002; MacPherson, 2001). Furthermore, by turning to non-Western sources, environmental educators help redress the very serious accusation that conceptions of democratic citizenship, human rights, and education are culturally biased towards Western learners and contexts (MacPherson & Tigchelaar, 2003).

The notion that we belong to a common world is not an invention of the scientific worldview or the Western Enlightenment. Mahayana Buddhism, as a case in point, advocates an even more expanded interpretation of citizenship responsibilities, what HH the Dalai Lama (1999) refers to as "universal responsibility." According to this Mahayana perspective of universal responsibility, human beings are not just responsible to one another but to the diversity of living beings, not just those inhabiting the planet Earth but throughout the universe. As we appreciate the extent to which the fate of the Earth and humanity are inextricably entangled in the survival and diversity of other living beings, there is the need to re-define our "world" and citizenship to mirror these complex interrelationships (ecologies) that challenge all our preconceived ideas of the limits of our world. This expanded consciousness or awareness suggests that it is no longer sufficient to frame students' identities and responsibilities within the context of cities and nations. We need to define what it means to be good biological citizens, supported by a planetary, even universal, ecological awareness and frame of reference and inspired and sustained by a bio-ethic.

Global Ecological Citizenship

The concept of citizenship emerged within the early city-states of Greece and Rome to frame the rights and responsibilities of enfranchised citi/zens (free, propertied males) in relation to the governance of the city polity. One of the principal functions of such states and their corresponding polities was to facilitate the equitable and just distribution and exchange of economic goods and services. So, citizenship was a role defined in relation to a human community, specifying one's rights and responsibilities with respect to human-to-human and human-to-"natural resource" economic exchanges. Later, during the colonial and industrial periods, the context of citizen's rights and responsibilities expanded to the broader domain of the governance and economics of nation-states and their colonial networks, such as the British "Common/wealth." In our times, we face the need for yet another shift or expansion of the domain of our citizenship precipitated by issues of globalization and scientific knowledge.

As science deepens our appreciation of the nature of our communities and exchanges to incorporate more physical, biological, and ecological contexts culminating in the Earth and ultimately the universe, our views of citizenship and education are shifting to address these expanding contexts. Paul Barry Clarke (1996) refers to this as *deep citizenship*, an idea that challenges Western notions of citizenship that draw sharp public/private, universal/local distinctions. Deep citizenship represents various attempts to increase the frame of our rights and responsibilities to encompass more inclusive contexts, communities, and activities grounded within the local and personal (Sauvé, 1999). Rather than limiting the understanding of citizenship participation to human governance and economic exchanges, this emerging view of citizenship emphasizes participatory and active democratic education and engagement.

Ecological citizenship extends this shift to deep (active, participatory) citizenship beyond the human to address our participation in biotic communities. The context of citizenship is not really "expanding" so much as deepening to remove artificial constructs that delimit arbitrarily the contexts and communities we consider relevant in decision-making. Just as deep citizenship refused to parcel off the public from the personal and intimate, so too deep *ecological* citizenship refuses to segregate arbitrarily the existential from the personal from the cultural from the biological (Næss & Jickling, 2000; Agyeman, 2002). All are sites impacted significantly by human decision-making, that is, by participation in community and values, and so should be included within any meaningful and informed conception of citizenship education in the 21st century.

Ecological Values

Differences in ecological and economic conceptions of *value* underlie the intensity of recent conflicts between global *ecological* citizenship and global *economic* citizenship. The Western Enlightenment shifted citizenship affiliations and responsibilities from monarchs, as representatives of God, to capitalist-democratic states, as representatives of the people. This mirrored a shifting worldview that affirmed the ability of freedom and desire to negotiate personal and common well-being. While free market values adjudicated a natural justice in economic affairs, majority votes enacted the common good in politics. With time and some distortions, the ideals of free enterprise and prosperity became overriding values of this citizenship model. The discipline of Economics rationalized this idealism by quantifying ideal markets and consumers on graphs, which misleadingly represented prescriptive or ideal cases as if they were descriptive of empirical reality. Even more contentiously, economics represented human production and consumption in a closed loop, as if the planet Earth and the environment were an inexhaustible resource that existed outside human economic activities. These Western Enlightenment-rooted *modern* values continue unabated in the current movement for global economic citizenship.

In contrast, the ecological view of citizenship and value emphasize principles of interdependence and well-being as ethical criteria to guide human decision-making. These differ significantly from their economic predecessors in that interdependence places a realistic constraint on the expression of freedom within the contingency of mutual dependence, whereas well-being introduces more complex factors than prosperity into what constitutes the ultimate end of sentient desire. Together, these values offer a way to temper the naïve individualism that is modernity's legacy by leaving the question of the location of the agent of desire unspecified. If we are interdependent with other human and sentient beings, then the well-being we seek is distributed. From this perspective, the greatest challenges we face are not posed by environmental crises, but rather, as Rees (1999) suggests, they are "a problem of human ecological dysfunction" (p. 3), to which I would add, a problem of human "ego" dysfunction.

To understand what a human ego dysfunction might be, it is helpful to first consider what a functional ecological identity is. Arne Næss (Næss & Jickling, 2000), the founder of deep ecology, describes his experience of an eco-centred, rather than an ego-centred, world: "I look at myself as a kind of stream—not as an ego. And the stream goes on. That doesn't mean that I am a relativist. I am a relationist" (p. 50). This experiential relationism is mirrored in the way ecologists perceive the "objective" world as well, not unlike the classical: "As above, so below." Lovelock (1991), the scientist who generated the *Gaia Hypothesis* that the planet Earth is a living system, describes the Earth in similar terms, whose "energy transactions are almost wholly in radiations. It receives visible and ultraviolet radiation from the sun and it excretes fairly low-energy infrared to the outside" (p. 238).

As regards "human ecological dysfunction," this refers to behavioural manifestations arising in particular from human economic activity. From an ecological perspective, the Earth is a system of subsystems drawing on the most rudimentary radiation exchange described by Lovelock above. As Margulis (1991) suggests, "the minimal ecosystem functionally has got to have a producer, in the fundamental sense, has got to have some organisms that take the source of energy, whether its chemical on the one hand, or light on the other—and those are the only two possibilities that we know—and it has to take back energy and it has to convert it" (p. 243). Insofar as any economic activity is dependent on this more fundamental ecological activity of radiation and energy exchange, then we can say that our membership in ecological communities, that is our ecological citizenship, is of greater significance and value than our human-focussed economic citizenship.

In this way, ecological function begins, on the one hand, with our experience of the world and the worldview we develop therein, and, on the other hand, with our collective recognition and protection of the fundamental energy exchange as the condition on which our collective and individual lives utterly depend. This paves the way for radically new conceptions of equity that challenge even the deepest anthropocentric biases of humanity. This would include the "equality" of human and non-human beings in an ecosystem, which can be established on the basis of their interdependence. Not only are human beings equal with one another insofar as we share a common planetary biosphere, but so too are we equal with all other living beings with whom we are inextricably related in both body and mind. Our lives are not, after all, sustained by an inert environment but rather by a web of living beings and shared experiences, which together generate the nourishment we need to survive—from the air we breath to the food we eat. In this sense, our environments are as much constituted by other living beings as cognitive and physical beings as by the "materials" we require to sustain us. This is the basis for the extension of ecology, as the study of the relations between organisms and their environments, into human-to-non-human and human-to-human, that is citizenship and education, relationships.

Thinking in this way helps to correct species-centric tendencies by recognizing other living beings as ends-in-themselves rather than simply the means to our happiness. Yet, the Kantian ethic of living beings as ends-in-themselves does not entirely apply to an eco-logic because the principles of interdependence and mutual co-dependent arising suggest that all living beings, including human beings, are necessarily both end and means. Even if the Earth is *not* accepted as a living system itself, it is *at least* the location of the exchanges between living beings that sustain life. In this respect, what an ecological value reinforces is the value of life reflected to some extent in all forms of ethics across all religions, cultures, and philosophies. This deepens into an understanding of virtue as that which promotes and *distributes*, not just life but, a *quality* life or *well-being* in the long-term. As the site that makes life possible, the place where knowing and desiring came into being, and the ultimate womb of all Earth-bound beings, the planet Earth constitutes a fundamental and common basis of value for all living beings, though in most cases this value is implicit or, one could say, unconscious. In turn, the value of life is the extent to which it conserves planetary life, not specific species, including human beings. And no doubt our fate is tied to the extent to which we value and conserve life as well, for it is as yet delusional to conceive that we could be sustained outside of the web of diverse living beings sustained within this planetary biosphere.

The best example to draw on is the case of cyanobacteria, one of the most numerous species on Earth with some of the oldest living members. These creatures exert more influence on our collective biospheric well-being than do human beings or any other creature, insofar as these micro-organisms regulate and monitor, through acting to sustain their own lives, the oxygenated atmosphere on which most other forms of life depend (Margulis & Sagan, 1997). This points out an important point, which is that living systems do not interact directly with "the Earth" as an environment or whole. Rather, such relations are mediated through our activities to sustain our own livingness and through our relations with one another, within and across species. For human beings, these relations are negotiated through language and culture, which can be understood as our "environments," and hence are key ecological phenomena. This is reiterated in Gadamer's (1996) discussion of the Greek root of the word *ecology—oikos*:

> The Greek word *oikos* meant the domestic house and in this connection we also speak of the "household". One learns to keep house with the means, energy and time that are available. The Greek word, however, means something more than this. For it includes not only the ability to manage by one's self, but also the ability to manage along with other people. One form of help which each of us can provide for ourselves, it seems to me, is to learn properly how to integrate this reliance on one another into our own lived existence. (p. 79)

One of the greatest challenges to managing "along with other people" is to identify a common basis for values across cultures and nations. With the exception of the Universal Declaration of Human Rights, to date we have been only marginally successful in doing so. Accordingly, in the ensuing vacuum, economic values have become the common standard by which international decisions tend to be negotiated. While there is a need for increased international discussions and agreements to promote and reinforce the universal principles and values reflected in the Universal Declaration, there is a parallel need to bring forward the agenda of the well-being of our common biological life and the nature of our interdependence in and with living systems, not just because it is "good" to do so, but because this constitutes a demonstrable and fundamental basis of value we share as living beings. After all, even within a more circumscribed humanist perspective, life, liberty, and the pursuit of happiness begins with life.

Ecological Ethics

From Diversity to Well-being

To establish an ethic capable of countering the predominance of economic values, what is required is a pan-human ethic founded on what we have in common, that is, biology, ecology, and certain tendencies that can be deemed "universal," cross-cultural values. To establish a biological or ecological basis for ethics, we must ask what criteria are relevant to the sustenance of life. First and foremost, it is the conservation of the organization of living systems, which are maintained, renewed, and evolve through decisions made by multiple living beings to be happy and avoid suffering. We might call such activities efforts to conserve well-being. So, while diversity may be a value from a biological systemic perspective, from the perspective of the agent (or "citizen"), the biological ethic of greatest concern to us is the conservation of well-being.

Interdependence

Shifting from biology to ecology, we find that any living system is intricately involved in the network of living beings on this planet. So we can say that such ecological interdependence expands this criterion of well-being to encompass others. Insofar as my own well-being is contingent on the well-being of others, then their well-being becomes a key criterion in my attempts to make more ethical choices. Furthermore, not only is the well-being of myself and other living beings a key criterion, so too is the well-being of the entire network of living systems, that is, the planetary ecosystem. Indeed, from this perspective, the well-being of the whole and hence of the mass of other living beings is more important according to such a criterion than my own personal well-being. This is the biological and ecological ground for what becomes in human cultures an ethic of universal or altruistic love.

Love

Of course, we can only form such an ethic initially on the basis of a rational inference that the planet exists, for the planet as a whole does not appear to us directly except as an intuition or for those privileged enough to peer back in a space ship. Instead, the ethic of love, even universal love, emerged biologically out of the highly socialized space of our upbringing and evolution, and in particular through the unusually protracted and close relations between a mother and her infant/child (Maturana, 1999, personal communication). It is not surprising, therefore, to discover an ethic or doctrine of love and compassion in most of the world's religions and cultures. Love is the relational space in which the other arises as legitimate or equal in their right to be, and so just as we naturally act to conserve our own well-being, love leads us to do the same for others. When combined with a rational mind capable of conceiving of universals, overcoming aversions and attachments, and inferring the existence of living systems beyond our immediate experience, love becomes the basis for an effective universal human ethic to guide our choices, and hence education, to enhance a more global well-being.

Ecological Citizenship Education as Interdisciplinary Practice

Bringing ecological values to the forefront of educational development and innovation only *begins* with changing courses and curricular contents. To date, ecology as a field of inquiry has tended to be introduced at the secondary education level through biology curricula. There is a need to expand these studies across the curriculum, to include more relationship-oriented, ecological studies of geography, health, culture, and language arts at all grade levels. This does not necessarily mean privileging the sciences over the humanities, social sciences, and arts either. As Evernden (1985) argues, biological and scientific approaches to ecology do not translate very effectively into social change; so, instead, he recommends that broadly defined ecological or *natural* relations be examined through phenomenological studies, which tend to be more readily accepted in the language, social, and creative arts than in the purer sciences with their disciplinary pretensions of objectivity. Only with sufficient awareness of their experiences with and in nature do students develop the sense of participation in, and responsibility for, their lived ecosystem-relations. In turn, this sense of participation and responsibility generates the motivation to be more proactive in protecting them.

Yet, the very nature of existing disciplinary structures and divisions have fragmented the ability of ecology to be studied effectively, segregating studies of biology from studies of language, culture, and social change. Accordingly, what is required are more explicit cross- and inter-disciplinary studies of ecology across the curriculum. After all, ecology *is* the study of relationships, which include *human* relationships. Accordingly, relations between our systems of knowledge become a key to understanding human ecology, including the impact language, culture, and biology has on our environments and other life forms (Nettle & Romaine, 2000). And human ecology is a key component of most ecology, including global ecology. Too often, as Rees (1999) points out, ecology is conducted as if the human species did not exist, when in fact, as a *patch disturber* without rival, humans, especially modern, urban consumers in more affluent states, exert a dangerously high *ecological footprint* on the planet Earth.[1] To open a space for greater insight into the effects of our cultures, values, and knowledge on our biological activities and ecological impact, we need greater disciplinary flexibility to see beyond our conditioned awareness, the boxes so to speak, giving rise to high-consumption practices in the first place.

To enhance ecological awareness and values across the curriculum, it is necessary to move beyond ecology as a form of information or knowledge to ecology as a basis for deep citizenship education. Such deep citizenship education needs to go beyond the limited purview of social studies or ethics programs to become reconstituted as an end of education itself, comparable to the emphasis 20th century progressives like Dewey placed on educating for democratic citizenship. This requires examining the ethical implications of any knowledge claim for its potential impact on our relations with others, including non-human others and environments. Such interdisciplinary studies would be first and foremost about ethical citizenship, about helping students to expand their sense of rights and responsibilities to embrace a more universal frame of reference. What are my biological rights as a sentient being? What do I need to survive or thrive? What do I share with other life forms, and how do these common needs frame my responsibility to them? Am I responsible to them only insofar as they further my species, or is there a deeper obligation to the promotion of the well-being of life across species, regardless of their relationship to me? Are they, using Kant's ethical gage, an end-in-themselves or only a means to my ends?

Science as Liberal Art

Just as the emerging ecological frame of reference calls for the inclusion of ecological issues across the curriculum, so too does it justify including citizenship and ethics in scientific ecological studies. In this respect, the implications of ecological ethics for education are twofold:

- to foster ecological citizenship, but also
- to foster *citizen ecologists*.

The latter suggests science education expand to include questions of values, of ethics, emotion, activism, and liberal (*liberalis*) educational objectives (making scientists "fit for freedom") beyond strict attention to orthodox scientific questions and methods aimed a producing fact.

Margulis and Sagan (1997) contrast citizen ecologists with professional scientific ecologists. To foster citizen ecologists, Margulis and Sagan advocate developing science programmes as liberal arts rather than as professional, scientific specializations with industrial applications. To this end, Margulis became involved in an innovative, interactive "Environmental Evolution" course at the University of Massachusetts, Amherst. As she suggests, "Why can't serious scientific courses at the college level, while respecting quantitative inquiry, teach the science as liberal art? Why can't the study of 'natural history' regain its respectability?" (p. 312). Drawing on the interest and love of the subject, nature studies becomes "fitted for freedom," capable of informing, adapting, and generating lifestyles (creating cultures) to promote and sustain a greater and more just common good. As Margulis and Sagan caution:

> As would-be planetary citizens we ignore this planetary bioplasm to our own detriment; our trash and garbage never go out—they only go around and around. Human beings, unlike cyanobacteria and grasses, are never productive. We are consumers of organic matter. Populations (as carbon consumers), intrinsically capable of unlimited growth, will always tend to expand and eventually be checked. We ignore these crucial messages from ecology to our peril. (p. 312)

Reflexive Practice Beyond the Limits of Reason

Yet, there are broader teaching and learning implications for educating ecological world citizens beyond these ethical and curricular implications. In recent years, considerable attention has been focused on changing the pedagogical practices of teachers to bring about educational and social reform. To interrupt the social and educational reproduction that accompanied apprenticeship approaches to pre- and in-service teacher education, critical and reform-oriented educators developed various models of "reflective practice" for teacher education programs. This notion of "reflective practice" generated a plethora of programmes, research projects, and scholarly articles on how best to stimulate such critical reflection and practice. By the 1990s, however, it became apparent that there were some major obstacles to students engaging in genuine critical reflection and to translating the resulting insights to altered classroom practice.

Carson and Johnston (2000), for example, describe efforts in one pre-service social science teacher education program to generate greater cultural and social awareness through classroom reflections and discussions. Not only did these produce considerable classroom conflicts and heated exchanges, but some of the expressed views of students tended to reinforce their pre-existing racial and cultural biases. Noting the friction and resistance that demands for critical reflection can generate in teacher education classes, these authors recommend what they call a "pedagogy of compassion" as the antidote, without explicitly describing how such a pedagogy might be cultivated. In later discussions, Carson (personal communication, 2001) borrowed from Buddhism to suggest a pedagogy of compassion would depend more on cultivating an awareness of suffering than on instilling or upholding principles of what is "right."

Part of the difficulty in the approach to reflective practice is the underlying view that rational analyses determine how we act as human beings. Although critical analytical activities can and should alter our behaviour, our conditioned desires and habits tend to persevere and become rationalized in the process. Furthermore, activities of rational or analytical reflection are necessarily conducted outside of the immediacy of the relevant experience. So, one is reflecting on abstractions of experience as memory or principles rather than on the complexity and spontaneity of lived experience. In the gap of space and time between such lived and analyzed experiences, there is a great margin for error in how we represent and view such experiences. Furthermore, the reflections are further separated from the future context and activities needing change, and the ability to bring about even well-reasoned changes depends on more complex factors than analytical reasons. It depends on such factors as motivation, courage, and the appropriateness of the specific circumstances one faces at the time.

Although such discussions might involve analytical reflections on suffering in one's own life and those of others, it also entails a non-conceptual awareness of suffering to generate any meaningful change in the lives of students and teachers alike. Such ability to be mindful of more subtle states of suffering and the desire to be free of them, and to recognize those states across living beings, is the premise of the cultivation of compassion (HH the Dalai Lama, 2000). In this respect, the key challenge teacher educators face to implement meaningful ecological "reform" through education is through a pedagogy of compassion to help student move beyond conceptual, analytical reflections to deepen their awareness of the experience of suffering in other living beings, and the desire to be free of such suffering, first in themselves and then extended to others. Such a pedagogy would focus on a felt sense of connection to the suffering and struggles of other living beings, and on the related ability to exercise pure attention or mindfulness in their presence. In this respect, it is a call back to the "natural philosophy" of the 19th century, but with a difference.

Conclusion

The tremendous fruits of the biological and physical sciences in the last century have developed in tandem, rather than in dialogue, with studies of culture, democracy, and citizenship. This has left a troubling chasm that is evident in our inability to grapple effectively with some very serious environmental challenges. This paper is a call for a new form of citizenship education suited to serve this evolving context. Ecological citizenship asserts the radical equality and participation of all sentient beings within the shared biotic community of the planet Earth—*The Blue Planet*. Some aspects of this curriculum identified in this paper would include a renewed emphasis on *liberalis* education for a global context, ecological values and ethics, interdisciplinarity, and a pedagogy of compassion founded on reflexive practice.

Notes

[1] As Rees (1999) points out, "We are naturally a patch disturbance species, whose capacity to disrupt the ecosphere is steadily augmented by cumulative learning and behavioural plasticity …. A patch-disturbance species may be defined as any organism which, usually by central place foraging, degrades a small 'central place' greatly and disturbs a much larger area away from the central core to a lesser extent" (p. 6-7). He carries on to explain his calculations of ecological footprints as a way to quantify the degree of modern human patch disturbance. "People are so psychologically distanced from nature that very few have ever asked themselves the most fundamental personal ecological question: 'How much of the Earth's surface is dedicated to supporting just me in the style to which I am accustomed?' Eco-footprint analysis provides an approximate answer to this question and most people are astonished to learn the magnitude of their continuing dependence on the ecosphere. The latest estimates show that the residents of high-income countries typically require the biophysical output of five to ten hectares (12-25 acres) to support their consumer lifestyles (Wackernagel & Rees, 1996)" (p. 8).

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