The Role of Traditional Ecological Knowledge in Education for Community-Based Resource Management.

By

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Introduction

Globalization, like colonialism, homogenizes and generalizes knowledge and practice. Formal systems of education are one of the most powerful tools in the process. They are both liberating and constraining. Some of the effects of globalization in terms of knowledge and practice run counter to the more particular and local needs for sustainable environmental and resource management. The issue to be addressed in this paper is that of bridging the enormous gap between the forces of globalization and effective community-based resource management through the medium of formal education, supplemented by informal education and traditional ecological knowledge. Traditional ecological knowledge is by definition place specific and, as such, may balance some of the homogenizing and generalizing effects of globalization.

The generalizing effects of formal education as a tool of colonialism was well recognized by the likes of Gandhi and Nyerere and gave rise to their respective "Basic Education" and "Education for Self-Reliance", components of their post-colonial visions. Each called into play variants and elements of local and traditional ecological knowledge. Community-based resource management approaches and experience, particularly with respect to common property resources, provide examples where local and particular foci can come into play effectively. One of the consequences of globalization and the attendant systems of education has been the loss or marginalization of traditional ecological knowledge, the associated knowledge systems, their practitioners and traditions and vernacular languages which are sensitive to local biodiversity (Berkes, 1999).

We argue that this need not be and that it may be detrimental to sustainable resource management. To illustrate the point, three examples from India are described and discussed. The examples provide evidence for the effective use of traditional ecological knowledge in community-based resource management and raise implications for formal systems of education.

Biodiversity contests for school-age children, some of whom may be short-lived school goers, in rural Gujarat and Maharashtra demonstrate a rich, largely untapped and marginalized resource present in the community. Gram Vidyapiths or rural degree colleges in Gujarat, founded on the Gandhian model of basic education provide an example within the formal structure of education where local and traditional ecological knowledge can be used to address community resource management needs. The Medicinal Plant Conservation Centre, headquartered in Pune, Maharashtra provides several instances whereby traditional ecological knowledge may be valued and used effectively in community-based resource management.

Background

Conventional science in all its forms and applications has been and remains a powerful tool in globalization. As a method for organizing information and creating knowledge and putting it into practice, science has on balance improved the human condition though not without some spectacular failures and dire consequences. Formal education, particularly as it is know in the industrialized and post-industrial world, is a primary instrument by which science is purveyed. Indeed, formal systems of education as they have emerged and evolved, closely mirror the development of science with its propensity for categorization, reductionism, empiricism and documentation. As a method for advancing human understanding of the world, science derives its power from the ability to explain, predict and generalize. In generalization, some particulars are lost and this may present the greatest weakness in the method when science is applied to specific problems at a local level. Generalized applications have failed to improve living conditions in specific situations on many occasions. In part, this realization led to an interest in the involvement of local people and their knowledge in environmental and resource management issues. As part of this, the formalized investigation and use of local or traditional knowledge in the scientific community or on its margins, commenced (Thompson, Warburton and Hatley, 1986). The study and use of traditional knowledge in environmental and resource management and development is now commonplace (eg. Warren, Slikkerveer and Brokensha, 1991; Banuri and Apffel-Marglin, 1993; Gadgil, Berkes and Folke, 1993; Berkes, 1999; Sefei Dei, Hall and Rosenberg, 2000; Sillitoe, 2000). Hybrid approaches, utilizing "sustainable knowledge" that combines scientific and local or traditional knowledge, have been applied to the study of environmental and resource management problems (Murdoch and Clark, 1994). Formal education, as an instrument of science and power, has not been so quick to shift focus from the global and general to the local and particular.

It has been recognized for some time that uniform and centrally-designed examinations, curricula and courses tend not to be sensitive to local circumstances, needs and historical precedents (Eisemon, 1989; Altbach, 1993; Teasdale and Rhea, 2000; Richards, 2001). When established, formal education systems may be exclusionary of those of different cultures and those not accustomed to the methodology of conventional science. This was a primary stimulus in Gandhi's "Basic Education" model, a major pillar in the move to self-rule in India (Richards, 2001) and for "Education for Self-Reliance" as undertaken by Nyerere in post-colonial Tanzania

(Semali, 1999). Indeed, it was in post-colonial Africa and within the move to "Africanize" governance, administration and education that some of the earliest debate about the science/traditional knowledge dichotomy took place (Horton, 1967). Likewise, increased attention to the use of traditional knowledge has become a factor in the call for self-governance and educational and legal reform among First Nations people in Canada (Battiste, 1998; Hall, 2000).

The Meaning of Traditional Knowledge

Definitions and meanings of traditional knowledge have been the subject of debate and discussion for several decades (Brokensha et al., 1980; Thrupp, 1989; Warren, Von Liebenstein and Slikkerveer, 1993; Agrawal, 1995; Sillitoe, 2000). A common description suggests that it refers to unique and local knowledge and learning systems existing in and developed by groups of people who are indigenous to a specific geographical area or region (Grenier, 1998). Generally, the dominant means of knowledge dissemination and preservation are oral, through demonstration in practice and through incorporation in cultural artifacts, traditions and ceremonies.

Traditional knowledge systems are dynamic and changing through time as a result of their basic empiricism and practicality (Berkes, 1999). Throughout the world, concern has been expressed about the loss of traditional knowledge and learning systems and many have searched for ways to preserve both (Warren, Von Liebenstein and Slikkerveer, 1993). However, preservation is not enough because all knowledge must be dynamic and change in response to changing circumstances. One of the mechanisms by which traditional knowledge is lost is through the erosion of vernacular languages and this was a particular concern of Gandhi as it is of contemporary observers. Where there is no documentation of this knowledge, it is not readily accessible to assist with future problems and circumstances. Some "lost" information may have been appropriated by other peoples and cultures and later exploited for material gain. In this context, the issue of traditional knowledge is never far removed from the very important concerns about intellectual property rights. It is ironic that the most effective means for preserving and protecting information from various knowledge systems is through the applications of conventional science and more recently, through electronic information technologies (Schoenhoff, 1993). The incorporation of traditional knowledge in formal education systems and designing more formalized structures for traditional or indigenous education are sometimes presented as a means by which traditional knowledge may be preserved and conserved.

For the purposes of this discussion, traditional knowledge is used interchangeably with indigenous knowledge and local knowledge, though the specific meanings of each may differ. Thus, we take a broader view of traditional knowledge than normally may be the case. For instance, many immigrant groups possess traditional knowledge that may be relevant and useful to their new setting but it would not be considered indigenous knowledge in the new setting.

Farmers and ranchers with a relatively short history of settlement on the Great Plains of North America may possess detailed local knowledge of weather, soils and wildlife but does this knowledge fit the definition of what is indigenous or traditional? In a practical sense, the differences are small (e.g. Eisemon, 1989). Also, the search for difference tends to divert attention from the substance and practical importance of the issues towards debates and semantics. Indeed, Agrawal (1995) argues persuasively for breaking down the barriers between different forms of knowledge, including that between traditional and scientific. We would argue that in the search for similarities lie the keys to successful incorporation of traditional knowledge into the mainstream of formal education and the search for solutions to environmental and resource management problems. Of course, the substance and processes of formal education would be altered as well.

Indigenous Knowledge and Education

The divide between conventional science and traditional knowledge (Agrawal, 1995) is mirrored by a divide between information purveyed by formal systems of education and that purveyed by non-formal, indigenous learning systems. Most theorists and practitioners have argued that formal systems of education have been remarkably insensitive to indigenous conditions, cultures, languages and knowledge in many parts of the world (e.g. Irwin, 1997; Brady, 1997; Inayatullah and Gidley, 2000; Mah, 2000; Peters, 2000). The discourse between traditional knowledge and informal education and formal education is not new if one views it as a subset of the debate between the practical and theoretical emphases in learning. Of course, the relationship of traditional knowledge to matters of power gives the debate and its resolutions strong political overtones and links to issues of human rights, equity, equality and justice (Hall, 2000).

The divide may be attacked at a variety of scales and levels including the philosophical, institutional, organizational, programmatic and curricular and the pedagogical. At the philosophical level, Gandhi, Nyerere and Friere, among others, regarded the formal education systems of the colonial powers as significant instruments of oppression and formulated their visions and models of education from that basis (Friere, 1968; Semali, 1999; Richards, 2000). The rigidity of the British colonial education and examination system and its tendencies to marginalize and dichotomize segments of society in India and to graduate large numbers of people, primarily men, who were poorly prepared for self-reliance, local employment and innovative career development was recognized during the drive for self-rule (Khyber, 1932) and the same remains an issue today long after independence (Powar, 2002). Gandhi and Nyerere went the farthest in formally articulating alternative models of education. Gandhi's "Basic Education" did borrow from the ideas of John Dewey and emphasized the importance of local knowledge and conditions, practical experience and vernacular languages. This model perhaps comes closest to bridging the gap between traditional knowledge and the knowledge of conventional science and informal and formal systems of learning. It has been put into practice to a limited degree in parts of India, as noted below.

The Gram Vidyapiths of Gujarat

The Gram Vidyapith movement in India traces its origins to the influence of Gandhi's "Basic Education" or *nai talim* (Chand, 1996). The Gram Vidyapiths are best developed in Gujarat, the home area of Gandhi. Each Vidyapith of which there are 23, is a small college which caters primarily to the rural, socio-economically underprivileged and historically excluded sections of Indian society with the objective of educating for self-reliance and a service orientation rather than for the formal employment sector. The medium for instruction is the vernacular language, ie. Gujarati in most cases. Vidyapiths offer a three-year degree in rural studies and in so doing represent an important institutionalized attempt to integrate local, traditional and practical knowledge with conventional knowledge and methods. In part, Vidyapiths are a reaction to the dominant systems of formal post-secondary education in India which have colonial roots through the University of London affiliations and examinations system, the legacy of which persists.

Chand's (1996) analysis indicates that although the Vidyapiths present a good model, in practice they have fallen short of the goal to fully integrate traditional ecological and local knowledge in the formal learning experiences of students. The analysis focused on Mahila Gram Vidyapith, a women's college in North Gujarat .The majority of students were from rural and socio-economically marginalized sections of society with agricultural and laboring backgrounds. Most students completed secondary school through *Buniyadi* or Gandhian Basic Education schools. Many of the students were first generation post-secondary and most understood Vidyapith education as an attempt to combine the value of standard curricula with practical, technical training. However, it was found that the traditional discipline- or subject-based organization of the curricula and the specializations of the teachers mitigated against the effective integration of material across the disciplines. It was found that the conventional science paradigm and "green revolution" technologies tended to dominate the subject taught in practice. Some of this was encouraged by the fact that Mahila Gram Vidyapith is academically affiliated with North Gujarat University which still ascribes to a centralized model for curricula and examinations. This affiliation is necessary to provide formal recognition and legitimacy to the degree but as it stands, it acts as an impediment to the application of the Basic Education model.

Nonetheless, as part of his study Chand (1996) did demonstrate means by which traditional ecological and practical knowledge could be incorporated into the standard curricula. This was accomplished through the introduction of fieldwork-based projects focusing on traditional and local practices in agriculture, horticulture, animal husbandry, animal health and animal nutrition. Specific projects addressed such topics as: identification of traditional and local veterinary medicines and their uses, traditional systems of partnerships in livestock ownership, informal village institutions for drought management and mitigation, traditional and local animal feeds and fodders and traditional tribal veterinary practices and medicines. While these projects constituted a step forward in the incorporation and use of traditional ecological knowledge, they were not sustainable without the active and on-going encouragement of teachers and in the face of affiliation requirements with the University. The experimentation at Mahila Gram Vidyapith

did, however, cause other Vidyapiths to experiment with project-based work and the Vidyapith Association in Gujarat to undertake a curriculum review. Some of the colleges undertook collaborative projects with NGO's and other external organizations to upgrade the use of traditional ecological knowledge in their programs. For example, students at Amirpur Gram Vidyapith became involved as interns in a GEF/UNDP sponsored project on conservation and management of dryland biodiversity in north Gujarat. Several Vidyapiths joined to execute a project titled "Using Diversity" sponsored by IDRC, Canada. Three Vidyapiths, in collaboration with the Centre for Environmental Education in Ahmedabad, initiated a project called Samvardhan. Samvardhan is directed to the nurturance of people and resources through participation in the use of traditional ecological knowledge for sustainable resource management at the local level.

Biodiversity Contests

Biodiversity contests focus on children and their traditional ecological knowledge. The philosophy that guides them is that children are the future guardians of biodiversity conservation and resource management at the local level. The idea of biodiversity contests, as articulated here, originated at SRISTI, an NGO based at the Indian Institute of Management Ahmedabad and was implemented successfully in various parts of India, Bhutan and Viet Nam through members of the Honeybee Network (www.sristi.org). The biodiversity contests were aimed at school going children and their teachers.

The process undertaken is initiated at the local level through public announcements, pamphlets and a group meeting with teachers, children and community members several days prior to the contest. On the predetermined day of the contest, the children bring plant specimens they have collected to the local school. A jury consisting of teachers, knowledgeable and interested community members, and forest staff interviews each child and scores them on their knowledge according to the following criteria: the number of specimens presented and their novelty, the habitats of the plants, the uses of the plants and presentation style. Winners are rewarded with prizes such as teaching/learning materials. Follow-up activities include: the creation of a school herbal garden, the creation of a school herbarium, and various displays. The results showed that children possess a remarkable corpus of informal knowledge about plants and their uses, particularly the medicinal uses for people and animals. Biodiversity contests of this type have taken place for a number of years in a number of rural settings and, together with two such contests recently conducted in rural schools in Maharashtra, they provide useful insights into the use of traditional ecological knowledge in formal education and the possible extension of this to community-based resource management and conservation.

Inventorying useful local biodiversity knowledge.
Analyses of prior contests in Gujarat (Chand, Shukla and Gupta, 1997) indicate that the average number of plants listed by children is 100. In one contest, a 16-year old correctly identified 116 plants in a village where the most knowledgeable adult reported to know 340 plants. In another

contest, a 13-year old identified 305 plants and a 12-year old identified 165 plants. In a recently organized contest in Amboli, Maharashtra, a 5-year old collected and identified 575 plants along with their uses while a 7-year old collected and identified 290 plants along with their uses. These are astonishing representations of traditional ecological knowledge gained quite apart from the formal school curriculum. In addition, in some contests, more than 60 indicators of environmental/ecological health (eg. moisture availability, soil fertility, groundwater presence, diseases and pests, etc) have emerged. Some of these indicators have been validated by systematic observations and scientific experimentation, adding credence to their possible use in monitoring ecosystem healt at the local level.

The process and the inventoried knowledge goes unrecognized in the formal school setting where the emphasis is on a competency-based curriculum structured according to the framework of conventional science. The contests have shown that some children who do very well in the contest are poor performers in the formal school setting and become identified as "laggards". This demonstrates a clear dichotomy between success in formal learning and the richness of informal, but perhaps more useful, knowledge among children. Traditional ecological knowledge of this type and the encouragement of its possession and expression is seen as important in future community-based resource management and it is seen as a means to engage some children more meaningfully in formal education. However, in the absence of any formal support and acknowledgment from within the institutionalized education system, there is little hope for these exceptionally gifted children to advance in and be legitimized by the wider society as important resources in biodiversity conservation and livelihood sustainability.

The intergenerational transmission of knowledge.

Maintaining the mechanisms and means for the intergenerational transmission of knowledge is essential for social learning within a society or community. The formalization of education through standard curricula has eroded intergenerational transmission of knowledge in most situations. There are benefits and costs to this that are well-discussed elsewhere. The biodiversity contests have revealed a very rich traditional ecological knowledge base in the communities where they have been conducted. The work suggests that this informal knowledge displayed by children is a direct reflection of the community's traditional ecological knowledge base. There is clear evidence that the children consult their parents, grandparents, other relatives and local knowledgeable elders in preparation for the contests. In 49 contests conducted in rural Gujarat in which 1600 children participated reveal that the elders are regularly consulted as part of interesting strategies for learning adopted by the children (Chand and Shukla, 2003).

The development of knowledge about local biodiversity and environment, in a community context, begins with several key sources. In this study, grandparents, rather than parents, played the most significant roles as a source of knowledge. In 18 of 31 cases, the grandfather was identified as the only significant teacher and mentor. In other cases, the father or an uncle served this role. Thus, the family provides the most immediate and effective instrument for the transmission of traditional ecological knowledge. Of course, it goes without saying that most of this knowledge transmission is oral, as is the process involved in the biodiversity contests. Some

of the knowledge transmission is practical or "hands-on", as is the process of plant collection in the contests. Children participating in the contests also were encouraged to question and seek advice on an informal basis, creating a dialectic model for learning which differs from the rote learning encouraged in some formal systems of education. This, the acquisition of traditional ecological knowledge encourages a more involved process of learning and perhaps greater community-wide investment in learning.

Post-contest influence: encouraging participatory conservation.

The experience has shown that the biodiversity contests may promote interest within the broader community to think about local conservation and environmental and resource management issues. This became evident in post-contest activities. For example, a contest held in Kerala some children brought seedlings which, in turn, were awarded to contest winners who took them home for planting. Award ceremonies are held as public community functions with local leaders, healers teachers and forest department staff in attendance along with children and their family members. This has allowed the various community stakeholders to gather and discuss local conservation and resource management issues where such a forum did not previously exist. Projects such as the donation of medicinal plants by the forest department and the creation of a knowledge forest by a local healer have emerged from these interactions. A platform for partnership was created by the contests and their aftermath in some cases.

Mobilizing teachers' commitment to conservation.

The biodiversity contests do require the active participation and support of teachers. Where the contests were held, the teachers did appreciate the contribution to local knowledge and understanding engendered by the contests. This has led to a reflection on their conventional methods of instruction and encouraged pedagogical experimentation and innovation with a focus on learning outcomes and encouragement of biodiversity conservation. From the earlier contests held in Gujarat, teachers provided feedback on the pedagogical value and this included such things as: the knowledge about plants allowed for clearer linking of environmental subjects, childrens' interest and participation in school increased, parallel activities such as debates and discussions were more easily initiated, etc. (Chand, Shukla and Gupta, 1997).

Many teachers have been involved in follow-up efforts at their schools and in their communities and beyond as a result of the contests. Initiatives include such examples as the creation of charts for display identifying the plants and their therapeutic uses, the organization of the collected material for school, district and regional science fairs and competitions, and the establishment of linkages between the contest-derived information and the standard science curriculum. NGOs such as the Ahmedabad-based Centre for Environmental Education, have experimented with the dissemination of contest results through projects such as Samvardhan, and BAIDIK (Biodiversity Awareness Integration Through the Documentation of Indigenous Knowledge)**.** Over half the teachers involved in the 2001-2002 contests in Gujarat reported some change in their own pedagogical practices most of which could be summarized under the heading "bringing the local outside environment into the classroom" through debates, discussions, guest lectures by local healers and plant experts, forest walks and demonstration projects such as herbaria, medicinal

plant gardens, etc. In the most recent contests in Amboli, Maharashtra there was follow-up through structured forest walks in which teachers were involved along with the children and community members as well as local healers and members of the local management committee of the NGO Medicinal Plant Conservation Centre (MPCC)m headquartered in Pune. This was a new and useful interactive experience for the teachers, students and community members creating a greater awareness of and investment in local biodiversity and environment.

The Medicinal Plant Conservation Centre

The Medicinal Plant Conservation Centre is a Maharashtra-based NGO headquartered in Pune and consisting of a network with 13 nodes, one of which in Amboli provides the focus for the following discussion. The MPCC organizes two main sets of programs: the vaidu sammelans or local healers workshops and conventions, and the village botanists (barefoot botanists) training program through which the capabilities of formal botanists and local healers are strengthened. The vaidu sammelans are designed to document the knowledge of local vaidus about plants, encourage value added activities whereby some plants can be used and sold locally for medicinal purpose, provide a platform for local healers to showcase their products, provide fora for local healers and other health practitioners to interact and encourage participation of the vaidus in local biodiversity conservation efforts. The village botanists program is broader with 3 or 4 such botanists being identified at each MPCC site. Selection criteria include: good knowledge of local plants and their uses and cultural significance, interest in local environmental and conservation issues, and ability to read and write. Most village botanists come from the ranks of local healers, forest guards and knowledgeable elders. A village botanists' workshop took place in December 2003 in Amboli and that experience provides the substance for the discussion.

Inventory of local plants and their uses.

The 10 vaidu sammelans conducted to date have documented the comprehensive uses of 326 plants and their formulations for use in 187 symptomatic treatments of illnesses. In addition, the village botanists' workshops have added to the inventory and the knowledge about the various plants. Most village botanist workshop participants could list more than 100 plants, their growing habits, methods of extraction and uses. The traditional ecological knowledge of the vaidus has attracted the attention of the forest department which subsequently has published a Marathi and English reference booklet which lists the names and uses of over 100 medicinal plants. Botanical, English and vernacular language names of the plants are provided. Included is a separate list of 49 wild vegetables and a list of the names, addresses and specialties of 113 practicing vaidus and healers. This is very useful resource for local and wider use.

Networking for lateral learning.

The workshops and conventions provide an opportunity for lateral and mutual learning among people with common interests and knowledge who have come together for the first time. For example, there are plants with the same or different uses in different regions and known under differing nomenclature. A plant like Crotolaria sp. is known as "ghgara" in Raigadh, "popti madre"

in Toranmaal, “khidkhida” in Nasik and “shann” in Jalgaon but has common medicinal uses throughout. The discussion led to this understanding and new information about its other uses known in some areas and not in others was reveled. The fruits of the “hingra” plant which is common across Maharashtra, are used for several purposes in different locations and this was revealed through the conventions. Different plant parts of common plants are used in different locations and the methods applied may differ by location. The lateral learning which occurs through the process of meeting and discussion may, therefore produce much wider and more effective use of traditional ecological knowledge. Mutual understandings developed around the use of ecological and environmental indicators which could be used by communities to monitor environmental health. The sharing of extraction methods leads to the more efficient and safer medicinal use of plants. Methods by which rare and useful plant species may be conserved and protected is another important area of shared knowledge engendered by the workshops.

Conservation through cross-scale learning.

The local healers and village botanists programs have been successful in generating learning at the local, regional and, to some degree, national levels. Of course, the impacts are most visible at the local level. The workshops are often attended by representatives of villages, clusters of villages, districts and the state. State or district forest department officials attend and have the opportunity to build relationship with local healers and village botanists. In one case, these interactions led village botanists to becoming forest management staff. Two of them had prepared a herbarium of 607 species, documenting 805 medicinal uses of 420 of these species. Group activities involving biodiversity contest participants, local healers, community leaders and forest department staff have resulted in a medicinal plant conservation plan for the Amboli area. Most healers and village botanists are men but in this case it has been determined that women healers have special skills and knowledge in the areas of pregnancy and cattle disease. These skills and knowledge are now included through the participation of women, breaking down some traditional social barriers.

In the case of Amboli, second level learning occurred between the village botanists/local healers and the formally trained botanists of the MPCC staff. Legitimization of some of the traditional ecological knowledge resulted from these interactions. The important areas of convergence included regularization between botanical and local nomenclature for plants comparison of codified plant uses in texts with uses reported by local healers and village botanists, identification of priority areas and species for conservation and simple resource mapping and herbarium development.

The Bangalore-based NGO, Foundation for Revitalization of Local health Traditions (FRLHT) is planning to expand the village botanists training program to five states, including Andhra Pradesh, Karnataka, Maharashtra and Tamil Nadu with the support of the Government of India Ministry of Forests and Environment.

At the international level, participation in the vaidu sammelans and the village botanist programs has led at least one individual to act as a consultant in guiding researchers from the International

Tropical Timber Organization, based in Japan, in the process of transect setting and species identification.

Conclusion

This paper has examined several of many attempts in India to incorporate traditional ecological knowledge into the mainstream of environmental and resource management. All of the approaches reviewed involve education in various forms, including those of the institutionalized systems of education. Effective community-based resource management must use all the means and information at its disposal. In the past, many of the means and the information have been marginalized from the mainstream of larger society and this is nowhere more apparent than in the formal education systems. Informal knowledge such as traditional ecological knowledge has not been given credence and thus has not enjoyed the legitimacy that the formal systems of education bestow on their knowledge and products. The Gram Vidyapiths of Gujarat, founded on the Gandhian philosophy of basic education, have provided an opportunity for the incorporation of traditional ecological knowledge and, one would assume, effective resource management based on full understanding and information, into the formal system of post-secondary education. However, this effort has struggled against the hegemony of a prescribed standard curriculum imposed from outside. Improvements rest on a few individuals within the system who are sufficiently motivated, usually as teachers, to go one step beyond what is prescribed and recognize traditional knowledge.

The biodiversity contests have revealed an astonishing corpus of information, knowledge and understanding relative to plants and their uses among children. Little of this is formally acknowledged by the education system and many of these young experts are poor performers within the standard curriculum and pedagogy. Biodiversity contests have given such youngsters new status within their communities but this status may not translate into economically productive careers. Nonetheless, there are the side effects of the biodiversity contests which include the engagement of teachers, community leaders, forest department staff and others who have some say and sway in resource management and conservation issues at the community level. The biodiversity contests do point to a double potential if the traditional ecological knowledge which is their substance can be legitimized within the formal system of education. This potential lies in effective and sensitive community-based conservation and resource management as well as in the increased participation and involvement of marginalized children in the formal education system.

The initiatives of MPCC in Maharashtra, through the vaidu sammelans and the village botanist training programs are on a larger scale than the aforementioned examples. Their success in engaging community level holders of traditional ecological knowledge is promising for future resource management both through the information and knowledge and through the recognition and legitimization of these knowledge holders. However, much of this work is done outside the formal systems of education. As a result, therein lies a danger that the successes will not be

sustainable in the long run. As an instrument of power the formal system of education is almost unmatched in the long run. It provides a particular form of knowledge and method of knowledge creation which are, in their own right, dogmatic and exclusionary but which also provide the basis of credentialing and thus legitimacy in the larger world. Nonetheless, every effort must be made to recognize and tap appropriately the vast store of traditional ecological information and knowledge so that it can be used in effective and sustainable resource management and conservation. MPCC is one example by which this is being attempted.

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