# Educational Paths towards Sustainability

## Proceedings of 3rd World Environmental Education Congress (3rd WEEC)

Edited by **Mario Salomone**

4

## Community awareness' importance

## L'importance des savoirs de la communauté

## La rilevanza dei saperi della comunità

SCHOLÉ FUTURO

**WEEC**
International Environmental Education Network

# Educational Paths towards Sustainability

*Proceedings of 3rd World Environmental Education Congress (3rd WEEC)*
*Torino (Italy), 2-6 October 2005*

*Actes du 3e Congrès Mondial de l'Éducation Relative à l'Environnement (3rd WEEC)*
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*Torino (Italia), 2-6 ottobre 2005*

## SESSION 4
## Community awareness'importance
## L'importance des savoirs de la communauté
## La rilevanza dei saperi della comunità

*Edited by/Sous la direction de/A cura di*:
Mario Salomone

*Edited by/Sous la direction de/A cura di*:
Mario Salomone

*Publishing coordination/Coordination de la publication/Coordinamento editoriale:*
Bianca La Placa

*Translations and collaboration/Traductions et collaboration de/Traduzioni e collaborazione all'editing:*
Patrizia Bonelli, Mei Chen Chou, Katherine Clifton, Dorys Contreras, Felicita Elss, Eliana Finotello, Elisabetta Gatto, Rachida Hamdi, Debra Levine, Catherine Marini, Simona Pede, Luciana Salato, Natalia Tolstickina, Zhou Yuep, Silvia Zaccaria.

*Cover/Couverture/Copertina:*
Beppe Enrici



*E-mail:*
secretariat@environmental-education.org
schole@schole.it

**Con il contributo di:**

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# MESSAGE FROM THE EDITOR

This volume is part of the series of texts that make up the *Acts of the 3rd World Environmental Education Congress - Educational Paths towards Sustainability*, held in Torino, Italy October 2nd - 6th 2006.

The *Acts* contain the texts which were sent in or which it was possible to gather in time and while it is obvious that no collection of materials could ever completely represent the richness and the atmosphere of an event of such dimensions and complexity in which the photographs and the videos that accompanied (or replaced) with sounds and images the words of the speakers and in which a major role was played by interpersonal communication and by the 'atmosphere' lived by the participants in the congress.

For further documentation reference can be made to the web site of the congress (www.3weec.org) and to the Permanent International Secretariat, which has its headquarters in Torino (www.environmental-education.org).

The *Acts* are composed of a general volume (published in two separate editions, one in English and French, and one in Italian) and of twelve themed volumes, one for each of the sessions that made up the congress. The general volume has been printed, while the themed volumes are only available in electronic form and can be downloaded from the congress web-site, they are also included on a DVD enclosed with the general volume.

Only the general volume, which contains the contributions from the two opening and closing plenary sessions have been translated into the three official languages of the congress. The contributions for the themed volumes have been left in the language in which they were presented.

It is important to note that many participants in the congress used a foreign language when preparing their papers and posters and this explains any linguistic errors that the reader may encounter, we apologise for these. The high quality of the texts and the variety of languages used made it impossible to thoroughly review all the material, therefore we preferred to leave to each author the responsibility for the style and/or formal precision of his/her work. The translations realised for the general volume were carried out under our responsibility.

Mario Salomone

# AVANT-PROPOS

Cet ouvrage fait partie de la série de volumes constituant les *Actes du 3rd World Environmental Education Congress – Educational Paths towards Sustainability* qui s'est tenu à Turin (Italie) du 2 au 6 octobre 2005.

Les *Actes* réunissent les textes qui nous sont parvenus ou qu'il a été possible de récupérer en temps utile. Cela dit, aucune collecte de matériels ne pourra jamais rendre complètement la richesse et l'atmosphère d'un événement d'une telle envergure et d'une telle complexité, où les photos et les vidéos ont souvent accompagné (ou remplacé) par des sons et des images les mots des intervenants et où la communication interpersonnelle et l'«atmosphère» vécue par les congressistes ont joué un rôle fondamental.

Pour une ultérieure documentation, nous renvoyons à ce qui a été publié sur le site web du congrès (www.3weec.org) et du Secrétariat permanent international qui est justement situé à Turin (www.environmental-education.org).

Les *Actes* sont composés d'un ouvrage général (publié en deux éditions séparées, l'une en anglais/français et l'autre en italien) et de douze volumes thématiques, un pour chacune des sessions du congrès.

L'ouvrage général est publié sur papier tandis que les volumes des sessions thématiques sont uniquement publiés en format électronique, téléchargeables du site web du congrès et contenus dans un DVD joint à l'ouvrage général.

Seuls les textes de l'ouvrage général, qui contient les interventions des deux sessions plénières d'ouverture et de clôture, ont été traduits dans les trois langues officielles du congrès. Pour ce qui est des interventions des sessions thématiques, elles ont été laissées dans la langue, ou dans les langues, dans laquelle/lesquelles elles nous sont parvenues.

Un avertissement important concerne le fait que de nombreux congressistes ont souvent utilisé pour leur paper ou leur poster une langue différente de leur langue maternelle et ceci peut expliquer les fautes de langue éventuelles que le lecteur ou la lectrice pourra relever dans certaines interventions et pour lesquelles nous vous prions de nous excuser. La grande quantité de textes et la variété des langues utilisées rendaient toutefois impossible toute réélaboration minutieuse : nous avons donc préféré laisser à chaque auteur la responsabilité de l'élégance et de la précision formelle de ce qu'il avait écrit. En revanche, nous assumons la responsabilité des traductions réalisées pour l'ouvrage général.

Mario Salomone

# AVVERTENZA DEL CURATORE

Questo volume fa parte della serie di volumi che costituiscono gli *Atti del 3rd World Environmental Education Congress – Educational Paths towards Sustainability*, tenutosi a Torino (Italia) dal 2 al 6 ottobre 2005.

Gli *Atti* raccolgono i testi che ci sono giunti o che è stato possibile recuperare in tempo utile, anche se ovviamente nessuna raccolta di materiali potrà mai rendere completamente la ricchezza e l'atmosfera di un evento di tale dimensione e complessità, in cui spesso le foto e i video hanno accompagnato (o sostituito) con suoni ed immagini le parole dei relatori e in cui un grande ruolo è stato giocato dalla comunicazione interpersonale e dalla "atmosfera" vissuta dai congressisti.

Per un'ulteriore documentazione si rinvia anche a quanto pubblicato nel sito web del congresso (www.3weec.org) e del Segretariato Permanente internazionale, che a sede proprio in Torino (www.environmental-education.org).

Gli *Atti* si compongono di un volume generale (edito in due edizioni separate, una in inglese e francese e una in italiano) e di dodici volumi tematici, uno per ciascuna delle sessioni in cui era articolato in congresso.

Il volume generale è edito su carta, mentre i volumi delle sessioni tematiche sono editi solo in forma elettronica, scaricabili dal sito web del congresso e inclusi in un DVD allegato al volume generale.

Solo i testi del volume generale, che contiene gli interventi delle due sessioni plenarie di apertura e di chiusura, sono stati tradotti nelle tre lingue ufficiali del congresso. Gli interventi delle sessioni tematiche sono invece stati lasciati nella lingua, o nelle lingue, in cui ci sono pervenuti.

Un'avvertenza importante è che molti congressisti hanno spesso utilizzato per il loro paper o poster una lingua diversa da quella materna e questo può spiegare gli eventuali errori di lingua che il lettore o la lettrice potrà trovare in alcuni interventi e di cui ci scusiamo. La grande quantità di testi e la varietà di lingue utilizzate ne rendevano però impossibile una rielaborazione a fondo: abbiamo quindi preferito lasciare a ciascun autore la responsabilità dell'eleganza e/o precisione formale di quanto scritto. Sono invece sotto la nostra responsabilità le traduzioni realizzate per il volume generale.

Mario Salomone

# L'ORIENTAMENTO ECOMUSEALE DEL MONTE BALDO ORIENTALE (VERONA, ITALIA) COME VALORIZZAZIONE PARTECIPATA DEL PAESAGGIO

**Chelidonio Giorgio - Braggion V. Titti**
*Centro E/A "E.Prato" – ItaliaNostra/Sezione di Verona*

**Abstract**

La complessità paesaggistica della dorsale baldense è ben nota per i suoi aspetti botanici (lo si definì "giardino d'Europa" già nel XVII secolo), ma assai meno per il suo insieme geo-antropico che spazia da:

- Un mosaico ambientale "profondo" quasi 200 milioni di anni, tale da spaziare dalla deposizione delle dolomie all'orogenesi alpina.
- Diffuse tracce preistoriche in quota riferibili dai cacciatori paleolitici alle prime deforestazioni praticate dagli agricoltori-pastori neolitici (circa 5000 anni fa).
- Un ambiente oculatamente modellato dall'attività antropica, fin dalla spartizione medievale degli alpeggi in "montagne".

La nostra associazione (dal corso per insegnanti 2003-2004 ARPA Veneto) sta proponendo di orientare la valorizzazione di tutte le potenziali risorse culturali in forma di rete ecomuseale nella convinzione che questa formula culturale può:

- Ricomporre il senso dell'appartenenza fra generazioni, proponendo elementi reali del patrimonio culturale come risorse educative e rinnovabili, anche per un turismo ecosostenibile e rispettoso dei luoghi e dello stile vita locale.
- Conservare e valorizzare i beni culturali nel loro scenario paesaggistico.
- Permettere la fruizione decentrata di singoli patrimoni storico-ambientali.
- Produrre nuove economie culturali diffuse nel territorio, anziché accentrarle in pochi luoghi assediati dal traffico.

Perché l'EA (educazione ambientale) può trasformare il patrimonio culturale di un territorio in elemento strategico del suo sviluppo a patto che l'identità locale venga ricomposta e valorizzata come fattore-chiave.

Nell'esporre brevemente le ragioni per promuovere un orientamento ecomuseale del territorio del Monte Baldo (Verona/Italia) non possiamo non ricordare alcune riflessioni-chiave espresse dal prof. Eugenio Turri († 2005),

cui dobbiamo gran parte delle considerazioni sulla complessità socio-ambientale di questo territorio pre-alpino, come ad esempio:

- Il paesaggio vive e racconta a seconda della nostra memoria, della nostra cultura, della nostra sensibilità nei confronti dei segni di cui è intessuto.
- La nostra percezione del racconto del paesaggio si fa partendo dai diversi elementi antropici che danno origine alla nostra percezione complessiva essi possono essere chiamati iconemi (perché stanno al paesaggio come i fonemi stanno alle parole di un discorso) gli iconemi forti danno identità ad un paese, ad una regione.
- Ma il paesaggio è fatto di tanti altri elementi, anche minimi, di scarsa visibilità e tuttavia spesso importanti.
- Il dramma delle generazioni che, spesso, non sanno trasmettere i valori e le memorie cui dovrebbero ispirarsi le generazioni più giovani (Turri 2000).

A nostro avviso, queste riflessioni coincidono sia con i fondamenti dell'EA (come metodo adatto a far percepire la complessità del paesaggio in quanto mosaico uomo-ambiente), sia con alcuni indicatori che orientano i temi di questo convegno (criticità e innovazione, connessioni società-cultura-economia, trasferibilità culturale, sostenibilità del modello educativo scelto).

L'economia montebaldina (marginale e perciò subalterna a quella della circostante area gardesana), a dispetto della sua ben nota ricchezza naturalistica e ambientale, non ha finora trovato in oltre 30 anni di discussioni la volontà di far decollare un progetto di Parco, nonostante essa costituisca un "troppo vuoto" turistico che la vicinanza del "troppo pieno" gardesano non riesce a compensare. Questo limite di sviluppo però ha finora determinato un basso impatto antropico su entrambi i versanti, permettendo un buon livello di conservazione non solo botanicamente ma anche come "montagna dell'uomo".

In questo contesto la stessa creazione dell'Orto Botanico di Novezzina non sembra aver dato finora i risultati sperati, forse anche per il suo orientamento disciplinare mono-tematico. Su queste basi, siamo convinti che, prima che altre scelte socio-politiche vi inneschino nuovi attrattori di turismo di massa, sia necessario attivarvi un orientamento ecomuseale che valorizzi e proponga questo territorio come "rete di risorse" ambientali e culturali.

Pur rimandando ad altra sede in cui dover ricordare le molte differenze che caratterizzano un ecomuseo (www.ecomusei.net) da un museo: quest'ultima opzione culturale, anche se realizzata secondo le più recenti tendenze scenografiche, rischia di veder implodere su stessa i propri potenziali di sviluppo, piuttosto che attivarsi soprattutto come volano per una capillare fruizione ambientale del territorio in cui si trova. Ci interessa evidenziare invece come un orientamento ecomuseale (inteso come rete di itinerari e punti di osservazione adeguatamente connessi per

far percepire la complessità dei luoghi) non debba nascere "dall'alto" (in forma di costosi attrattori museali) ma da iniziative decentrate, capaci di attivare processi educativi rivolti sia alla popolazione locale sia ad una fruizione didattica: i primi potranno innescare una conoscenza-coscienza del valore dei luoghi in cui abitano, mentre i secondi potranno avvalersi non solo di una maggiore ospitalità ma anche fruire di un sapere diffuso, di un "abitare la storia ambientale" ben diverso dagli standard informativi di stereotipate guide turistiche. Evitando così anche il rischio di un potenziale sviluppo tipo *trullalero-land,* così facile nei casi in cui si è voluto stagionalmente travestire intere comunità, applicando soluzioni scenografiche, museali e non, che cadono in eccessi di semplificazione culturale, orientandosi allo "stupire per intrattenere", spesso banalizzando in forme di animazione anche temi storici o preistorici, secondo logiche di puro consumismo culturale.

A nostro avviso neppure la soluzione a "rete di musei" è risolutiva del problema identitario, come ben esemplifica la vicina Lessinia veronese dove appunto una nutrita rete museale di stampo naturalistico non è capace di contrastare il crescente massacro paesaggistico prodotto dalla proliferazione socio-economica delle cave di marmo e di pietrame.

La nostra idea-guida quindi non è promuovere una rete di micro-ecomusei ma rendere capillarmente fruibile l'intero territorio in chiave ecomuseale, connotandola specificamente secondo i principi dell'esplorazione educativa cioè dal "vicino e noto" verso il "distante e sconosciuto", sia nella dimensione territoriale che in quella cronologica. Fin dalle prime esperienze abbiamo incluso negli itinerari ecomuseali anche frequenti micro-laboratori per ottenere un maggior rinforzo cognitivo secondo l'equilibrata percezione del "vero ed esatto" teorizzata da Konrad Lorenz (1985).

Sintetizzando, a nostro avviso, l'orientamento ecomuseale di un territorio più o meno ampio ma connotato da elementi omogenei di storia uomo-ambiente:

- Conserva e valorizza un insieme di beni culturali nel loro ambiente e con il loro scenario paesaggistico, permettendone una più immediata e completa leggibilità e godibilità.
- Permette la fruizione decentrata di singoli patrimoni storico-ambientali, armonizzandone il valore anche socialmente, purché ricomponga e riattivi anche elementi d'identità locale dimenticati o quasi.
- Produce nuove economie culturali diffuse nel territorio anziché accentrarle in pochi luoghi, dislocazione che, fra l'altro, determina congestioni di traffico, finendo, quindi, per degradare i luoghi stessi che le ospitano.
- Sposta flussi turistici da aree "troppo piene" ad altre "troppo vuote", magari vicine.
- Orienta ed attiva, anche culturalmente, nuovi indotti economici, promuovendo piccole attività ricettive, una ristorazione non massificata, produzioni gastronomiche tradizionali ed artigianati tipici.

- Ricuce e/o rinsalda il senso dell'appartenenza fra generazioni, in modi adeguati all'essere fieri di condividere e offrire il proprio patrimonio culturale, considerandolo non come curiosità per turisti "mordi e fuggi", ma risorsa rinnovabile per un turismo colto ed orientato a modi di fruizione non occasionali, rispettosi dei luoghi e dello stile vita di chi vi abita.

Quindi, certo non per musealizzare i versanti montani baldensi, ma per attivarvi una rete di unità e punti di osservazione ecomuseali abbiamo ideato l'itinerario Affi-Novezzina, a partire dal corso ARPAV/ItaliaNostra 2003 (http://www.arpa.veneto.it/pubblicazioni/htm/scheda_pub.asp?ID=108), tenutosi presso il nostro centro EA "Elsilena Prato" di Ferrara del Monte Baldo. Si tratta, infatti, di un'asse ecomuseale principale da cui estendere un sistema di percorsi ambientali rivolto a:

- Alle comunità locali perché conoscano e condividano la complessità ambientale e la ricchezza culturale del loro territorio, nonché i suoi equilibri evolutivi.
- Alla didattica scolastica come laboratorio EA (sia formativo per insegnati - come sperimentato nel corso ARPAV/ItaliaNostra 2003 - che esplorativo per gruppi di studenti).
- All'educazione permanente, proponendosi in formule plurigiornaliere o settimanali per famiglie (o per gruppi infra-generazionali) come già stiamo facendo (dal 1992) con sezioni di ItaliaNostra.

Qualora infine l'ampiezza del territorio baldense orientale sembrasse eccessiva da ecomusealizzare, basterà confrontarsi con l'ecomuseo "Dalle Dolomiti al Garda" (www.dolomiti-garda.it), attivato in base alla Legge n. 13/2000 della Provincia Autonoma di Trento sul territorio di ben 8 Amministrazioni comunali. Questo per evidenziare che il modello ecomuseale europeo sta ormai ponendo solide radici anche fra la valle dell'Adige e quella del Sarca.

Concludendo, è possibile progettare un futuro eco-sostenibile per gli abitanti, vecchi e nuovi, del versante orientale baldense basandolo sulla propositività decentrata tipica degli orientamenti ecomuseali, facendo interagire in modi armonicamente sinergici le naturali vocazioni dei luoghi con un processo di ricomposizione dell'identità locale e delle attività coerentemente connesse.

Come ha affermato M. Maggi (responsabile dell'area di ricerca ambiente e territorio dell'IRES-Regione Piemonte) nel convegno ICOM 2000, la cultura può essere elemento strategico nello sviluppo, e l'identità locale va sostenuta come fattore competitivo nel progettare il futuro sostenibile di una comunità nel suo ambiente.

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# RURAL POVERTY, ILLITERACY AND THE QUEST FOR FOREST RESOURCE CONSERVATION IN NIGERIA

**Biodun Ogunyemi**
*Olabisi Onabanjo University, Ago-Iwoye, Nigeria*,
*boye20022003@yahoo.com*
**Kolawole Raheem**
*University of Jyvaskyla, Jyvaskyla, Finland*
*raheem@cc.jyu.fi*

## Abstract

This paper addresses itself to four major questions:

- What is the nexus between rural poverty, illiteracy and environmental degradation?
- Under what conditions are the poor likely to be involved in anti-conservation practices?
- To what extent are the conservation promotion strategies in Nigeria successful or unsuccessful?
- How best can forest resource conservation be promoted, taking into account the challenges of living among the rural poor?

The popular "explanation" for deforestation and loss of forest resources in Nigeria (and, indeed, sub-Saharan Africa) revolves mainly around the activities and lifestyles of illiterate rural dwellers who are said to be ignorant of the implications of loss of biodiversity for sustainable development. Available evidence however suggests that the common definition of "literacy" is oblivious of UNESCO's concept of functional literacy. Successive governments in Nigeria have approached the issue of forest resource conservation and survival needs of the rural people rather mechanically through strategies like legislations on biodiversity conservation, annual tree planting campaigns, non-formal and adult literacy promotion, and partial provision of rural infrastructure. This paper submits that these and other strategies have not achieved the desired result partly due to policy inconsistency and largely because of the neglect of economic injustice evident in the distribution of resources and power structure which fundamentally foreground the rural people's lifestyles and environmental behaviour. The paper calls for an endogenous-holistic environmental literacy programme that "puts the people first" in Nigeria as a sustainable way of arresting the country's fast depleting stock of flora and fauna.

## Introduction

In much of the tropical world, valuable forest resources are vanishing at a rate that threatens the sources of meaningful livelihood for the rural people. The World Bank (2000) reports that one-third of the world's population depend on wood fuel as a significant energy source while 90 per cent of the 1.2 billion poor derive their livelihood from forest resources. Recent accounts however point to new patterns of resource exploration and exploitation that are unsustainable particularly in Africa. According to Kituyi (2004, p. 230),

> …the abstraction and conversion of natural resources such as minerals and forests, as well as processing of agriculture-based commodities potentially present the biggest concern for material and energy losses. It is on these sectors that economies and livelihoods of most countries in Africa depend.

The Nigerian situation vividly illustrates this situation. According to Nathaniel and Adebobola (2005), forestry experts have estimated that about 65 of Nigeria's 560 species of trees are now faced with extinction while many others are at different stages of risk. In addition, the forest elephant, chimpanzee, leopard, yellow-backed duiker, the royal python, the Nigerian quenon (*Cercophithecus erythorgaster)* are among the animals on the endangered list. It has also been reported Nigeria loses more than 350,000 sq. metres of its land annually to the advancing desert. For instance, desert dunes had buried many villages in Borno State, while farmers had been forced to abandon their ancestral farmlands due to sand-dune encroachment. Available data further reveal that more than five million head of livestock in the Borno-Yobe axis are under serious threat as life-supporting oasis in the region are gradually drying due to the effect of desert encroachment.

One major consequence of this trend is the worsening of poverty level, a condition worsened by the preponderance of illiterate population, in Nigeria. And, indeed, the Nigerian situation quite illustrates the evident circularity in unsustainable use of environmental resources, rural poverty and illiteracy. This paper attempts to answer four major questions with reference to Nigeria:

- What is the relationship among rural poverty, illiteracy and environmental degradation?
- Under what conditions are the poor likely to be involved in anti-conservation practices?
- To what extent are the conservation promotion strategies in Nigeria successful or unsuccessful?

- How best can forest resource conservation be promoted, taking into account the challenges of living among the rural poor?

The paper relies mainly on secondary sources, drawing on data and reports available in print and electronic materials.

**Rural poverty, illiteracy and environmental degradation**

Environmental degradation connotes a condition in which the elements of the life-support system (air, water bodies, land, forest) have been significantly altered to the point that it is no longer capable of maintaining its natural equilibrium or mechanism for self-adjustment. In the natural habitat, these elements interact in a symbiotic manner that complement each other to support life-forms and make the earth habitable as home for humans. However, human use and mismanagement over time have led to a situation in which the natural give-and-take relationships have not only been disrupted, but also significantly weakened in manners that currently threaten the very survival of human species that depend on them.

This is evident in incidences like desert encroachment, climate change, unpredictable rainfall in many parts of the world, and the growing incidence of toxic waste problem. It has been estimated that nearly half of the world's original forest cover has been lost, and each year another 16 million hectares are cut, bulldozed, or burned. Indeed, forests provide over US$400 billion to the world economy annually and are vital to maintaining healthy ecosystems. However, current demand for forest products may exceed the limit of sustainable consumption by 25% (Population Reports, 2000).

Evidence of environmental degradation is mounting and has been the driving force behind global movements on improving the quality of human environment.

Since the first World Conference on Environment in Stockholm (1972), conferences and summits have also been held in Rio de Janeiro (1992) and Johannesburg (2002), among other places, to consider the various dimensions of environmental degradation and ways of handling them. The twin-issues of poverty and illiteracy have featured prominently at these various discussions on environmental resource management problems. The Rio Earth Summit particularly placed education at the centre of efforts at achieving consciousness about sustainable living while Johannesburg underscored the need to address the conditions of the poor as a pre-requisite to sustainable development.

The Nigerian situation evidently illustrates the interrelationship between poverty and illiteracy on one hand, and environmental degradation on the other. At the African Union Extraordinary Summit on Employment and Poverty Alleviation held in Burkina Faso in September 2004, Nigeria's Minister of Labour and Productivity, Alhaji Hassan Lawal, put poverty in the country in context by declaring that:

> At independence in 1960, Nigeria's poverty rate was 15 per cent of the population which translated into about eight million Nigerians. Forty-four years on, the population of Nigeria living below the international poverty bench-mark of US$1 a day is 70.2 per cent. At the current level of the country's population of 126.2 million, this translates into about 89 million people living in abject poverty thereby making Nigeria a nation with the highest concentration of people living in extreme poverty (see *The Guardian*, Lagos, September 19, 2004, p.14).

With over 70 per cent of Nigerians residing in rural areas and well over 70 per cent of them being unable to read or write (Oyejide, 1998), there is no gainsaying the fact that rural poverty and illiteracy are the major landmarks of the Nigerian condition. An overwhelming major of the rural dwellers are unable to make the kind of investment in land, labour and capital that will help to reverse their condition of marginalisation and borderline survival in the Nigerian equation.

This condition of poverty undermines their capability to use resources around them in ways that would not compromise the delicate balance of environmental elements. However, this is not to say that the illiterate-poor are incapable of relating to the environment in a wholesome manner. For, every people have always devised means and methods of preserving the cherished resources of their environment within the indigenous socio-cultural milieu to guarantee their continued survival in an inter-generational perspective.

Examples of local practices in this respect abound in traditional Africa and Nigeria as illustrated in sacred grooves, seasonal fishing, and group hunting (Ogunyemi, 2000; Asabere-Ameyaw & Anamuah-Mensah, 2003). Under the capitalist mode of production, however, the rural poor are forced to act in environment-unfriendly manners if they must survive. According to Ekekwe (1997, p. 132).

In modern economy, the environment is a means to an end, a source of profit. Whereas the members of the traditional society obtained only use-value from their environment, people in the modern community see it as a source of exchange-value. Because trees can now be harvested and sold for firewood and timber, deforestation - and with it the destruction of delicate ecosystems and loss of biodiversity - and soil degradation are only a few steps away. Money and capital which permeate every culture and defy every custom turn any fish in the river into fair game.

It therefore amounts to blaming the victims whenever the rural illiterate-poor are condemned for degrading the environment when the dictates of their survival leave them with no alternatives. Issues relating to this phenomenon are explored further in the next part of this paper.

## Forest resources and the rural poor

Environmental resource management, among other things, connote two inter-related concepts - conservation and preservation. Conservation deals with the use of renewable resources sustainably and avoiding wasteful use of non-renewable natural resources. This suggests that fisheries, wildlife and forestry, for example, should be used in a manner which respects and protects the threshold of sustainability.

Preservation, on the other hand, implies that selected natural resources like unique biological formations, endangered or threatened species, representative natural and cultural sites of importance, be set aside and left alone so as to maintain their characteristics in a manner unaffected by natural or human activities to the fullest extent possible (Okidi, 2003).

The leading conservation problem in developing countries like Nigeria is one of dire poverty. This, in turn, leads to the over-exploitation of natural resources in order to live and make a living. Indeed, the main conservation challenges in Nigeria relate to those of meeting needs for food, fuel wood and water without compromising environmental stability, problems of checking erosion and pollution, and problems of developing wildlife (flora and fauna) for food, tourism and scientific and other values. Indeed, forest conservation is central to all these because the Nigerian forests house valuable woods needed for domestic and industrial purposes; they store useful non-wood products such as fruits, fibres and medicinal plants; and the forests protect the land resources against desertification and soil erosion, in addition to serving as the sanctuary for wildlife resources and providing avenues for human recreation (NEST, 1991).

The most desirable conservation strategy therefore will be one which factors the people's realities into its activities and programmes. In the words of Wangari (1992, p. 42),

> The kind of conservation that should be promoted is that which recognises its primary responsibilities in providing for human needs, while relying on environmental stability to ensure sustained satisfaction of these needs.

This presupposes a policy environment that guarantees good quality of life for all and sundry. For it is unrealistic to explain environmental disasters such as drought and desert encroachment in isolation without considering the extreme situations that are implicit in the everyday conditions of the people in a country like Nigeria. In fact such consequent development may be an outcome of policy failure especially when efforts at environmental resource conservation ignore the people's reality.

Hence, the rural poor do not necessarily act out of ignorance (illiteracy) of the consequences of environmental degradation in general or

unsustainable exploitation of forest resources in particular. And it is plausible to argue that it is because of "literacy" that many of the indigenous strategies for protecting and managing forest resources have been undermined. Hardly are environmental impact assessments carried out before locating "development projects" in rural areas. Where this is done, it is often merely for the purpose of fulfilling official requirements. Preservation centres in sacred groves and rivers are cleared with impunity in the process of constructing roads, dams and factories that do not, in the final analysis, impact favourably on the rural areas where they are situated. A case in point is the Niger delta region where the presence of oil-exploring multi-national corporations like Shell and Chevron has worsened the environmental crises - water and air pollution, soil infertility, etc - and deepened the people's poverty level (e.g. see Ake, 1996).

Consequently, the so-called developmental projects often become major sources of environmental problems and the worsening of rural poverty in Nigeria.

Rural population use fuel wood because kerosene or gas is too expensive and inaccessible for majority of them. Between May 1999 and September 2005, for example, the incumbent civilian administration has reviewed upward the prices of petroleum products including kerosene and gas. For example, prices of petroleum products (including kerosene and gas) have been reviewed about five times in the lifespan of the civilian administration that came to power in May 1999. From a bench-mark of less than 20 Naira six years earlier, a litre of kerosene now sells for upward of 60 Naira. And with the price of cooking gas also rising phenomenally, the people in the middle class not only struggle for kerosene as a source of domestic fuel with the rural poor but also turn to fuel wood on frequent occasions that kerosene supply becomes erratic.

The net result is that unavailability and unaffordability of gas and kerosene continue to put pressure on fuel wood as the source of energy particularly among the rural poor.

## An overview of Nigerian strategies

Official attempts at promoting forest conservation in Nigeria dated back to the colonial days. During this period, a system of periodic forest blocks was introduced which involved allocation of forests every 25 years and exploitation on a 50-year circle. With the first allocation of 1,815 sq. km in 1945, the next re-allocation would have been due in 1996 to allow for regeneration of the forest. The second allocation was made in 1970, with its re-allocation scheduled for 2021. However, between 1980 and 1983, most of the forests reserved for 1996 allocation were corruptly allocated to middlemen, who re-sold their concessions to wood processing firms, who in turn over-exploited and ruined the concessions (Peters, 1993).

It is significant to note that, while it lasted, the forest blocks allocation system overtly sidelined the poor who lacked the wherewithal

required for scrambling for forest allocation. The colonialists introduced the system not out of genuine concern for the preservation of the country's forest resources but to ensure a steady supply of forest woods in furtherance of their imperialist mission. This implies that the real objective of the "periodic forest blocks allocation" was to sustain the promotion of the industrialization rather than conservation of tropical forest in Nigeria. This actually was the position of FAO concerning the tropical forests in developing countries, as asserted by Raumolin (1988).

On their own part, the post-colonial administrators supported it because it provided an avenue for enriching their patrons even though it impoverished the poor rural dwellers.

Meanwhile, the Federal Government regarded the Sahelian drought of 1969-72 which caused extensive damages to crops and animals in several parts of northern Nigeria as a national disaster. Among other things, a national tree planting campaign was mounted while afforestation programmes were introduced to stem desert encroachment. In 1977, the National Committee on Arid Zone Afforestation Project was set up. Consequently, a programme of shelterbelt planting along the northern border was embarked upon. The Committee was later dissolved in 1985, and its functions were transferred to river basin and rural development authorities. These latter bodies were themselves later re-organised and have since been disbanded. In 1987, the Forestry Management, Evaluation and Coordinating Unit (FORMECU) was established in the Federal Ministry of Agriculture, Water Resources and Rural Development to co-ordinate the World Bank and African Development assisted forestry projects.

In its evaluation of the foregoing strategies, however, NEST (1991, p. 20) concludes that

> the haphazard nature of the afforestation projects embarked upon by these various agencies has resulted in only little being achieved.

For instance, the total forest estate in Nigeria was put at 10 per cent of the land area by 1988, far less than the internationally recommended 25 per cent. But

> unless afforestation is made to fit in with agriculture, it takes up land which may be in high demand by farmers (NEST, 1991, p. 120).

It was perhaps in anticipation of the reaction of the rural people in this respect that the Babangida's Military Administration established the Directorate of Foods, Roads and Rural Infrastructure (DFFRI) in 1986 as a strategy for addressing the multi-dimensional nature of rural privation.

A direct evaluation of DIFFRI is beyond the scope of this paper. However, evidence from available reports (e.g. NEST, 1991) indicates that the DIFFRI strategy did not have much to show for the amount of resources committed to it. It was therefore no surprise that the Abacha Military Government which succeeded the Babangida's did not hesitate to scrap it. Moves were then made by the Abacha and succeeding governments to address the issue of poverty alongside afforestation projects. These moves gave rise to the emergence of the Family Economic Advancement Programme (FEAP), Poverty Alleviation Programme (PAP), National Poverty Eradication Programme (NAPEP), and National Economic Empowerment and Development Strategy (NEEDS). In its recent assessment of these various poverty-reduction strategies with implication for quality of life for rural dwellers, however, *The Guardian* (Lagos, September 19, 2004, p. 14) remarks:

> It is obviously not enough to throw money at poverty without ensuring that it is applied for executing specific projects. "The bulk of the funds expended on the programmes disappear into the pockets of cronies to those in authority. Besides government concurrently deploy policy measures which foil the stated intentions of the programmes.

Beside the seeming failure of economic blueprints aimed at addressing poverty, legislations in respect of forest resource conservation have also not yielded much dividends. By 1991, it was estimated that Federal legislations on forest conservation and related matters were 19 and more were in the pipeline going by the volume of technical reports being produced by the National Advisory Committee on Conservation of Renewable Resources established in 1989 (NEST, 1992).

While acknowledging the significance of legislations in environmental resource management, Anijah-Obi (2003) notes that most, if not all, the laws exist merely on paper, since individuals, oil companies, as well as large and small scale industrial concerns have continued to flout the laws without being disturbed by the laws or law enforcement agents while also having nothing to fear from the nation's courts.

It is in this context that the condition of the Nigerian forest resources seems to be getting worse by the day. Nigeria's natural vegetation estimated at 600,000 sq. km in the 1880s had been reduced by over 90 per cent in the early 1990s. And out of the remaining 38,620 sq. km, one third is mangrove type forest in the largely inaccessible south-eastern delta swamps where water, air, and soil pollution resulting from about five decades of concentrated oil exploration and production threaten it with extinction (NEST, 1991).

Thus, to date, like Baker (1986) says of Kenya, efforts at forest resource conservation in Nigeria represent an elaborate mechanism for

rearranging the ways of avoiding the real issues - unequal access to land, marginalisation of the poor, lack of alternative to resources being conserved, institutional oppression of the poor, lack of security apart from land or children - under the guise of environmental protection and its attendant allies. But as the inadequacies of such technical approaches begin to manifest themselves, the national government is forced to introduce palliatives as currently being debated in respect of the pricing of petroleum products in Nigeria.

## Towards a sustainable conservation strategy

It is undeniable that a healthy natural environment plays a fundamental role in poverty eradication. Since many people in the rural areas depend directly on natural resources for their livelihoods, there is need for well-functioning ecosystems that provide a wide range of valuable benefits to wildlife and human society - from goods such as food (e.g. fish), fibre (e.g. reeds for building and weaving), water, medicines that sustain life to services such as natural water filtration, flow control, partial soil retention, nutrient cycling and wildlife habitat (NCF, 2003, p. 21). As NCF further observes, unsustainable use of natural resources can exacerbate poverty as essential resources are exhausted and the services and functions of natural ecosystems are destroyed or diminished.

> By the same token, and at the other extreme, the strict protection of natural resources that excludes the people can also intensity poverty(NCF, 2003, p. 21).

Thus, by integrating conservation and development of local communities, bottom-up decision-making and support for measures to meet people's needs and improve local livelihoods, people can be empowered to secure sustainable livelihoods that are positively linked to natural ecosystems (NCF, 2003).

What the foregoing suggests is the need for an endogenous-holistic paradigm that factors the requirements of meaningful living - realistic income, good roads, educational/functional literacy, healthcare, etc - into Nigeria's forest resource conservation drive. This paradigm is erected on three inter-connected planks: One, that forest conservation (and environmental protection in general) strategies are only workable when they are developed *with,* rather than *for*, the people. Two, that for literacy to promote forest conservation practices, enhance income and prevent environmental degradation particularly in the rural areas, it must be made functional. Three, that people's attitude towards resource management is mediated by their social, political and economic circumstances; perceived injustice in any of these domains of living engenders distrust over the state's

right to keep resources in trust for all as exemplified by the raging controversy over Nigeria's Land Use Act of 1978.

Our proposal here is of course not new. Mangane (1992), Wangari (1992) and Population Reports (2000), among others, have all called for environmental management models that spring from people's practical requirements for meaningful existence. But the functional literacy dimension to this model deserves some elaboration as this aspect has not enjoyed much attention in literature. In the first place, the literacy programme should be promoted within the context of integrated, universal education with both the formal (school-based) and the non-formal (out-of-school) components. Enrolment arrangements in the two sectors should be made flexible to allow for re-absorption of dropt-outs especially the rural females. In addition, the curricula should be highly diversified to reflect the interests, yearnings and aspirations of the rural poor. A rural parent may be discouraged from sending his/her child to school if what is taught is largely at variance with family requirements for survival in the locality. But the same parent would, in addition to sending children, himself/herself participate in adult literacy programmes if knowledge gained can, for example, be used to boost agricultural production and raise income (Adesanya & Ogunyemi, 2001).

The experiment in migrant herdsmen and fishermen education in Nigeria which began over a decade ago could have passed for a good step in this direction but for its politicisation and tendency to associate it with the sharing of the "national cake".

For a meaningful and sustainable programme, target beneficiaries must be involved at every stage of the functional literacy project - planning, implementation and evaluation. It must tap from the reservoir of knowledge, skills and ways of life of the local people on which it builds to improve habit and practices related to environmental resources management and poverty reduction. For example, traditional ways of forest conservation should be revisited to upgrade them for modern use within the context of functional literacy. Also, seasonal hunting should be encouraged by involving the rural population in deciding when. There are still some rural villages that have traditional seasonal ban on fishing and hunting in Nigeria. In addition, the slogan "Plant a tree when you cut one" should be further popularised by giving incentives to the rural population who hold the key to success in afforestation. In addition, improved logging systems that will minimally destroy other plants around should be promoted while encouraging the re-use of organic waste (composting) which is indigenous to the rural people as fertiliser. All these and other environment-friendly practices should form the core of the participatory environmental education project that would be fostered within the in-school and out-of-school functional literacy programme. There is necessity for an in-depth reappraisal of government housing policies in Nigeria. The present policies, apart from making it difficult for rural dwellers to own better houses, are not promoting conservation. Instead it is making the rural land owners to sell off their

forest land cheaply to rich people from the urban area who are not interested in conservation but maximum exploitation of the land for economic profits. Above all, the structural defects which put the rural poor at disadvantage in the socio-economic matrix must be addressed concurrently with efforts to promote literacy and environmental management. Cost of energy sources (particularly kerosene and gas) should be reduced for those who live in the rural areas. The sales should be rationed and strictly controlled to lessen the abuse of such form of social security for the rural population. The ongoing encouragement by government at national, state and council levels for the planting of cassava for mass export to China, on the surface, looks attractive in economically empowering the rural poor. However, unless well managed by relevant authorities, such venture could further deplete the forest. People will clear more forestland and destroy the ecosystems to plant the "cash crop" which on the long run may result in environmental disaster of monumental proportion.

## Conclusion

The facts of forest degradation cannot be denied in Nigeria and tropical Africa of today. However, a lasting solution does not lie in palliatives, legislations and similar measures characteristic of the technical approach. At best, some of these measures could only be supportive to a model that mobilises people - men and women, youth and adults - for action against the circumstances that make them over-exploit the rural environment. This paper has suggested an endogenous-holistic empowerment model. It is hoped that further research would be conducted on the suggested model to further establish its relevance to resolving the poverty-conservation equation in Nigeria and, indeed, sub-Saharan Africa.

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# ASPETTI DELL'ADATTAMENTO DELL'UOMO ALL'AMBIENTE ALPINO: RICERCHE ANTROPO-ECOLOGICHE

**Emma Rabino Massa**
*Dipartimento di Biologia Animale e dell'Uomo, Torino*

L'adattamento a un dato ambiente è un processo graduale che richiede molte generazioni, pertanto lo studio di una popolazione isolata è interessante per valutare l'interazione tra le caratteristiche genetiche e l'ambiente. Infatti le popolazioni rurali attuali non possono essere considerate come un residuo di una società del passato; esse si evolvono velocemente, pur essendo ancora testimoni di una storia culturale, sociale, biologica e antropologica che non deve essere ignorata.

La caratterizzazione genetica di una popolazione assume una notevole importanza in quanto propedeutica alla risoluzione di molti problemi ecologici e di possibili programmi di intervento nel campo della medicina sociale e della pianificazione territoriale.

Modelli diversi di genetica delle popolazioni, in particolare quelli relativi agli "isolati" mostrano la necessità di integrare i dati demografici con quelli bio-antropologici. Le popolazioni rurali attuali sono popolazioni particolarmente interessanti perché soggette a profondi cambiamenti.

Le ricerche hanno considerato gli aspetti del rapporto uomo-ambiente, con lo scopo di valutare i meccanismi intrinseci ed estrinseci responsabili delle biotrasformazioni, i meccanismi microevolutivi e i processi di adattamento delle piccole comunità montane delle Alpi e dell'Antico Delfinato, sia dal punto di vista biologico che da quello storico e socio-culturale.

Le indagini sulle popolazioni di Postua (Val Sessera - Vercelli), dell'Antico Delfinato italiano e francese (Val di Susa - Chiomonte e Vallouise - Briançon - Francia) si sono basate sulle analisi:

## Biodemografiche

Le indagini condotte da Girotti e Boetsch (Boetsch et al., 2002, 2005) hanno preso in considerazione i parametri vitali, la mortalità, l'isonimia, la consanguineità. Lo studio ha messo in evidenza la presenza, in queste popolazioni, di elementi in grado di innescare fenomeni di deriva e di isolamento.

Nel Brianzonese la popolazione della Vallouise è stata oggetto di uno studio che ha considerato diversi parametri: culturali, genetici, sociali, per un periodo di molti secoli.

Tra tutti i fattori considerati, nel direzionare la dinamica riproduttiva, i fattori sociali apparivano certamente i più significativi.

In ambiente di montagna, dove lo spazio riproduttivo è molto ristretto e molto rapidamente saturato, si constata che le famiglie autoctone adottano delle strategie matrimoniali che tendono a evitare la frammentazione delle proprietà agricole e l'incesto. Infatti la divisione del patrimonio in modo egualitario e in maniera ricorrente nel corso delle generazioni potrebbe portare a una dispersione del patrimonio, qualunque sia la sua consistenza (Prost et al., 2005).

Al fine di evitare questa dispersione il modo per contrastare la parcellizzazione dell'eredità sta nella scelta di un partner consanguineo prossimo, che permetterà di mantenerne l'integrità.

Questo tipo di strategia porta inevitabilmente a una alta percentuale di endogamia che in questa regione delle Alpi supera il 90% nel corso di parecchi secoli.

Girotti (Girotti et al., 2002) ha effettuato l'analisi della mortalità a Chiomonte dal 1670 al 1989. Dall'esame di 14516 decessi è risultato che fino alla metà del 1800 il 50% dei decessi avveniva entro i primi 14 anni di età; in seguito l'età di morte è aumentata progressivamente. All'inizio del secolo, infatti, la metà della popolazione raggiungeva i 49 anni, mentre nell'ultimo decennio, oltre il 50% giunge a 75 anni di età (Fig. 1 e 2).

L'andamento della mortalità rappresenta un'importante fonte di informazione per valutare come le condizioni ambientali, igieniche, sanitarie, socio-economiche e culturali possono influire sui cicli vitali. Sulla mortalità infatti agiscono numerosi fattori che possono incidere in maniera differente, oltre che nei diversi ambienti, anche nei diversi momenti storici e contesti socio-culturali.

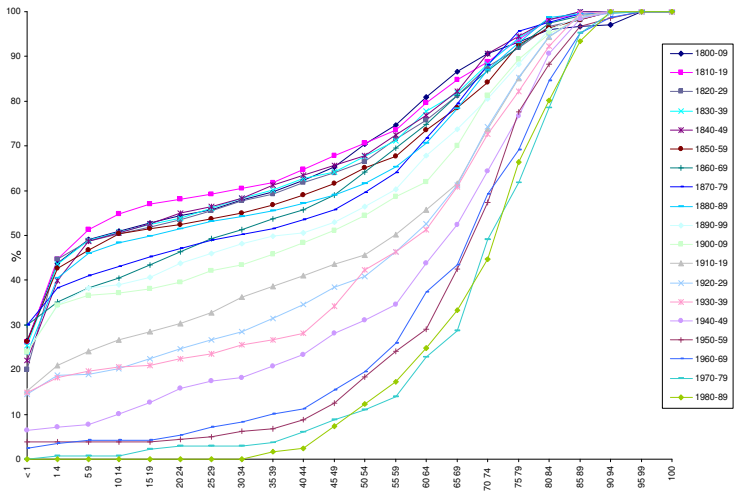


Fig. 1. Percentuali cumulative dei decessi

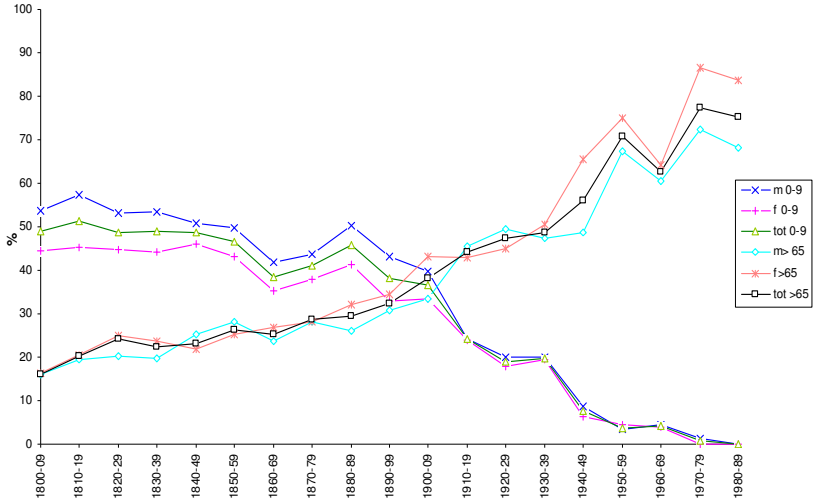


Fig. 2. Percentuali cumulative totali e per sesso per intervalli d'età quinquennali dei decessi avvenuti prima dei 9 anni e dopo i 65.

Per quanto riguarda il comportamento matrimoniale della popolazione di Postua, l'endogamia, che supera quasi sempre il 90%, evidenzia un sistema chiuso di scelta del coniuge. Fino alla metà del secolo scorso i Postuesi sceglievano, di preferenza, un coniuge del paese e i pochi "stranieri" nella maggior parte dei casi giungevano dai paesi limitrofi.

Postua ha vissuto in modo isolato almeno per duecento anni, dal 1640 al 1850, ma è probabile che la situazione procedesse immutata già molto tempo prima del periodo preso in considerazione in questa ricerca.

La chiusura della popolazione in se stessa, praticamente senza flusso genico con l'esterno, ha sicuramente favorito l'instaurarsi di fenomeni di deriva genica, in particolare dovuti all'effetto del fondatore, viste le ridotte dimensioni iniziali della comunità.

## Antropogenetiche

Tramite lo studio dei parametri antropologici, delle caratteristiche emogruppali, dei marcatori plasmatici, dei polimorfismi del DNA è stato evidenziato che tutte le comunità hanno caratteristiche peculiari. Le frequenze aplotipiche determinate da Marin (Marin et al., 2005) per la popolazione di Postua indicano un isolamento genetico dovuto alla presenza di un ristretto numero di aplotipi fondatori e a uno scarso flusso genico. Lo studio a livello molecolare conferma la tesi della deriva genica: Postua mostra, sia nell'analisi del cromosoma Y che in quella del DNA mitocondriale, una forte individualità anche rispetto alle comunità più vicine. Gli aplotipi più diffusi a Postua, sia per il cromosoma Y che per il

DNA mitocondriale, sono di origine paleolitica e durante l'ultima grande glaciazione sono rimasti confinati nel santuario climatico situato tra la penisola iberica e la Francia, nella zona attualmente abitata dai Baschi, per poi ridiffondersi da lì in tutta l'Europa al termine della glaciazione.

Il pool genico di Postua, caratterizzato da una forte impronta paleolitica e un minor contributo di aplotipi neolitici, accomuna quindi il paese a popolazioni "geneticamente antiche" come quella dei Baschi. La ragione non va probabilmente ricercata in eventuali contatti tra le due comunità, ma piuttosto nei fenomeni di isolamento e di deriva genica che hanno interessato entrambi i gruppi umani dal paleolitico. Sul campione della Vallouise sono state condotte da Salis (Salis et al., 2002) analisi sul terzo fattore del complemento (C3), sul componente gruppo specifico (Gc) e sul fattore B della properdina (Bf). È stato evidenziato un solo polimorfismo raro per quest'ultima, la variante S1F, mentre i polimorfismi delle altre proteine sono quelli più comuni, pur manifestandosi con frequenze alleliche che risultano essere peculiari.

Il confronto con altre popolazioni ha evidenziato che, in generale, in questa popolazione sono state riscontrate caratteristiche di tipo principalmente europeo, anche se è emersa la presenza di alcuni aspetti peculiari, riferibili da una parte al maggior isolamento geografico e dall'altra a contatti, nel passato, con popoli provenienti dall'Europa del Nord (Fig. 3).

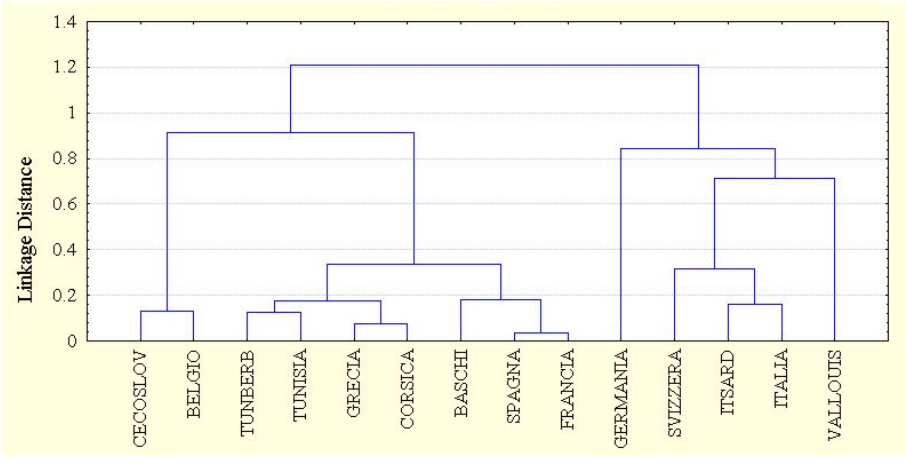


Fig. 3. Analisi dei clusters dei polimorfismi sieroproteici nelle diverse popolazioni europee e nord africane

La ricerca ha permesso inoltre di indagare i flussi genici e le barriere riproduttive legati alla struttura i matrimoniale di queste popolazioni sottoposte a forme complesse di isolamento.

In conclusione i parametri biodemografici e l'analisi dei marcatori genetici si sono rivelati strumenti molto utili per la valutazione della diversità genetica a livello microgeografico. Inoltre lo studio della variabilità ha fornito preziose informazioni, che riguardano non solo gli aspetti biologici, ma anche quelli socio-culturali nel processo evolutivo del rapporto Uomo-Ambiente.

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# NELLA REGIONE SOMALA DELL'ETIOPIA SOLO I PASTORI NOMADI POSSONO SOPRAVIVERE

**Alberto Salza, Marilena Bertini, Gianluca Pressi**
*CCM Comitato Collaborazione Medica*

Nel Corno d'Africa vivono circa 15 milioni di pastori nomadi: la più alta concentrazione al mondo.

Queste persone, attualmente, sono tra le più svantaggiate e marginali delle minoranze d'Africa. Le cause sono storiche (isolamento), politiche (rapporto nomadi-stanziali) e ambientali (instabilità climatica). Il progetto di CCM e AVEC-PVS , finanziato dalla Commissione Europea (European Initiative for Democracy and Human Rights), si occupa dei loro diritti.

Lo Stato Regionale Somalo dell'Etiopia ha una popolazione stimata di 3,4 milioni di abitanti (1997). Il 70% della popolazione pratica la pastorizia nomade o semi-nomade su un territorio che riceve dai 250 agli 800 mm di pioggia l'anno. La maggior parte del territorio è sottosviluppata rispetto alla media nazionale, con pochissimi servizi e infrastrutture. L'amministrazione statale e locale rimane ancora debole.

L'area del programma è nel distretto di K'elafo, lungo il fiume Wabe Shebele e sull'altopiano dell'Ogaden centrale. Il clima, tra arido e semiarido, è connesso al monsone, con due stagioni delle piogge (*gu*, tra aprile e fine giugno, e *deyr*, tra metà ottobre e metà dicembre), inframmezzate da due stagioni secche (particolarmente pronunciato il *jiilal*, tra metà dicembre e aprile). Le stagioni delle piogge mancano spesso del tutto.

**Titolo del progetto: "Supporto al sistema sociale tradizionale dei pastori nomadi somali, nello Stato Regionale Somalo dell'Etiopia", Ogaden, area di K'elafo.**

Obiettivo generale: preservare, rafforzare e rivitalizzare la cultura dei nomadi attraverso la protezione di specifici diritti umani e di tipici modelli di gestione delle risorse, in funzione delle locali "basi di conoscenza".

Obiettivo primario: proteggere e supportare lo status sociale dei nomadi somali per favorirne l'integrazione nel sistema socio-economico dell'Etiopia. Solo recentemente, con la Costituzione del 1994, adattata nel 2000, ai pastori nomadi viene riconosciuto lo status di gruppo umano destinatario di speciale considerazione e diritto, in quanto minoranza svantaggiata. I nomadi somali subiscono una duplice marginalizzazione: come gruppo etnico e come pastori.

Obiettivi specifici:

- Incrementare la consapevolezza dei diritti sociali di base dei pastori.
- Rafforzare la capacità organizzativa dei gruppi pastorali nomadi.
- Migliorare le interazioni tra governo, autorità locali e pastori nomadi.
- Aprire questioni di genere e migliorare la posizione sociale delle donne.

Razionale:

- I pastori nomadi sono gli insostituibili custodi della biodiversità e non i desertificatori nel mito degli stanziali.
- Il loro modello di vita è sostenibile.
- Il riconoscimento e la registrazione dei gruppi nomadi mette sul mercato il loro "capitale nascosto", integrandolo alla macroeconomia.
- La difesa dei diritti deve passare dal patrocinio esterno alla gestione diretta delle comunità.
- Rapporti di genere innovativi retroagiscono sull'educazione degli individui e sullo sviluppo della società.

Il processo di autoaffermazione, conservazione e integrazione culturale dei nomadi si basa su:

- Utilizzazione di un approccio appropriato e sensibile e di una strategia d'impatto a scala minima (diritto alla diversità culturale).
- Coinvolgimento della comunità in processi di *capacity building* e *empowerment* (diritto all'autodeterminazione sociale e politica).
- Dialogo tra i gruppi nomadi e i rappresentanti politico-amministrativi locali e nazionali (diritto al riconoscimento e alla registrazione).
- Elaborazione di pacchetti didattici dedicati per i pastori, derivati da basi di conoscenza locali e scientifiche (diritto a un'appropriata educazione permanente).

Taccuino di campo:

> Se lo Stato vi costruisse delle case e poi delle scuole, un ospedale, le botteghe. Se vi scavassimo pozzi con acqua sempre disponibile e pulita, come è vostro diritto, accettereste di sedentarizzarvi da queste parti?

Dopo un conciliabolo parla un vecchio:

> Certo, ma solo se lo Stato è disposto a darci anche l'erba. Senza erba muoiono gli animali. E poi moriamo noi.

Se l'educazione scolastica non rende un nomade un pastore migliore, è molto probabile che questa forma di sussistenza si estingua. Se per andare a scuola il nomade deve sedentarizzarsi, i suoi animali saranno in pericolo: o abbandonati al pascolo o affamati nel recinto.

Se i nomadi saranno forzati a sedentarizzarsi, il Corno d'Africa andrà incontro a un'immensa catastrofe umanitaria: si dovranno sfamare almeno 10 milioni di persone che al momento sono autosufficienti.

L'umanità ha evoluto la pastorizia contemporaneamente all'agricoltura, integrando l'utilizzo delle risorse: attività intensive su piccolo territorio ad alta produttività (agricoltura) e mobilità estesa su vasto territorio a bassa produttività (pastorizia nomade).

I pastori nomadi integrano un territorio flessibile con un capitale su zampe. L'imperativo è la mobilità, in funzione dell'erraticità delle piogge e la variabilità imprevedibile di ambiente e clima.

Il fattore limitante è l'erba, non l'acqua. Gli animali trasformano l'erba in proteine assimilabili dall'uomo: latte, sangue e carne. L'erba è pascolata durante gli spostamenti periodici verso i punti d'acqua. Il movimento di uomini e animali è come quello di un organismo vivente che respiri: contrazioni ed espansioni. Se bloccate il movimento, sopraggiunge l'apnea e l'organismo muore.

Ogni progetto con e per i pastori deve essere altamente flessibile. Lo scopo è quello di aggiustare il progetto in funzione delle persone cui è destinato. L'operazione è pianificata, organizzata e messa in azione come un *progresso a partire da* diritti locali e non un *progresso verso* diritti universali.

"Diritti umani": una cassetta degli attrezzi per impedire agli agenti di divenire pazienti.

Parlare oggi di diritti a un gruppo umano tra i meno considerati al mondo non è aria fritta. I diritti umani hanno a che vedere con ciò che è giusto, non con ciò che è bene. I diritti umani non esistono di per sé: vengono generati da individui e culture. I diritti umani non hanno a che vedere con la sacralità e l'innata dignità della persona, ma proprio con il fatto che siamo capaci di azioni ingiuste e orrende. Essi definiscono, nel modo più semplice e locale, le condizioni minime per ogni strategia di sopravvivenza: la "buona vita". La legittimità dell'intervento deriva così dai bisogni dei nomadi, non dai nostri. Il consenso informato delle popolazioni locali diviene imperativo.

Il progetto si propone di generare diritti attraverso 3 fasi:

1. Ricerca e analisi del potenziale della cultura locale sul diritto (tassonomia dei valori);
2. Disseminazione dei concetti dei diritti umani "universali" (pluralismo dei valori);
3. Dichiarazione di diritti umani glocali (integrazione dei valori).

La fase 1 si concentra sul diritto al movimento (priorità dei nomadi), sul diritto alla salute (priorità degli individui) e sul diritto all'acqua e alle minime condizioni di vita (priorità delle comunità); si individuano i *target groups*.

La fase 2 discute la Dichiarazione Universale dei Diritti Umani del 1948 con le comunità nomadi raggiunte a piedi e in automobile nei punti di transumanza; si utilizzano appositi media, in quanto l'analfabetismo in zona supera il 95%; si individuano i potenziali iniziatori locali, da addestrare.

La fase 3, per mezzo di workshop centralizzati, tende a formare un gruppo registrato permanente di supporto ai diritti dei pastori nomadi in Etiopia, mediatore con le autorità locali e il governo federale. Questa fase coinvolge operatori e comunità in due funzioni operative:

- Funzioni permissive: fenomeni che innescano processi di sviluppo del sistema.
- Funzioni istruttive: fenomeni che costruiscono e mettono in opera sistemi di circuito per operazioni specifiche.

**Attività implementate nella fase 1 (marzo-aprile 2005, alla fine della stagione secca *jiilal*)**

- Messa in opera della base operativa, dotata di radio e computer.
- Coinvolgimento delle autorità locali, per mezzo di incontri multilaterali e illustrazioni del programma.
- Assunzione e formazione del personale locale per la partecipazione comunitaria.
- Elaborazione di una rete di rapporti con e tra i principali clan di pastori nomadi dell'area di K'elafo: Awliyan, Bahgari e Awdaq, tutti appartenenti al clan-madre degli Ogaden, per mezzo di contatti prolungati con gli anziani di riferimento.
- Primo contatto partecipato con gli insediamenti mobili dei nomadi sul territorio (pianura in automobile e altopiano a piedi) e definizione dei *target groups*: 587 insediamenti famigliari (*aqal*) con contatto visuale o intermediato di 3896 individui (densità media di 6,63 per *aqal*). Spesso il contatto non aveva precedenti.
- Illustrazione del programma durante i contatti. Raccolta informazioni sui diritti e sul concetto di "minimo di vita buona", attraverso piccole assemblee e questionari.
- Raccolta di indicatori di abbandono pastorale e inurbamento verso K'elafo, con indicazione che le attuali cultura materiale e

mobilità sul territorio sono funzioni dirette della siccità (1991) e della guerra civile somala dei primi anni Novanta.
- Formazione del personale locale, con particolare riferimento all'alfabetizzazione mediatica, all'animazione partecipatoria e all'analisi teorica dei diritti umani.

**Attività implementate nella fase 2 (luglio-agosto 2005)**

- Sostenuti 4 programmi di formazione-informazione sui diritti umani con i 3 clan differenti oltre clan minori.
- Gli argomenti affrontati durante questi incontri sono stati: diritti umani, diritto alla salute umana ed animale.
- Sono state contattate numerose organizzazioni etiopi e internazionali che in rete continueranno la discussione sui diritti dei nomadi.
- Preparato il workshop che si terrà con le autorità etiopi a novembre, in cui la rete di organizzazioni farà advocacy.

La terza fase inizierà a novembre e consisterà soprattutto nella organizzazione di workshop con rappresentanti delle comunità locali e del governo.

# COMMUNITY-BASED APPROACHES TO ENVIRONMENTAL EDUCATION: LESSONS FOR SOCIALLY CRITICAL EDUCATION AND BIODIVERSITY CONSERVATION

**Shailesh Shukla and James S. Gardner**
*Natural Resources Institute*
*University of Manitoba, Winnipeg, Canada*

## Introduction

Community-based approaches to environmental education (EE) are receiving renewed interest as part of UNESCO's call for education for a sustainable future.

While these approaches are designed to build on local efforts, they may face several challenges in addressing local environmental issues with a range of stakeholders, including local communities, especially rural educationally and economically disadvantaged communities in developing countries. Such communities have developed their own knowledge systems for survival and management of natural resources. A community-based approach to environmental education in such a context should therefore be sensitive to and recognize the informal local knowledge base in order to be effective.

The purpose of this paper is to describe three such community-based environmental education approaches in India and to assess their educational strategies including the use of local knowledge systems. The paper seeks to address two main research questions:

- What kinds of village-level community-based EE approach should link the local knowledge (local communities) and formal education (school) for local biodiversity conservation?
- What are the educational features (target groups, communication strategies, outcomes) of these community-based EE and how can they be supported by formal EE structures?

The paper is divided into three sections. The first section reviews prevalent "paradigms" in EE and discusses in brief the utility and limitations of the socially critical "paradigm" in understanding and implementing the community-based EE. It also highlights some of the successful initiatives of community-based EE in India. Using case studies and interactive-adaptive research design, the second section of the paper describes and analyses three innovative environmental education approaches viz. biodiversity contests, recipe contests and community plant diversity register in two remote and economically poor villages in the state of Maharashtra, India.

These techniques are examined in terms of the environmental education strategies used (including local knowledge), the target groups reached and the barriers for effective communication. Finally, implications for school-based polices (such as formal EE curricula and practices) for strengthening community-based EE for sustainable conservation are outlined.

## Community-based environmental education: a review

### Approaches to environmental education

The recent debate about educational "paradigms" in environment education is dominated by a socio-cultural focus (Sauvé, 1996; Palmer, 1998). This is evident in the three major approaches to environment education (proposed by Bertrand and Valois (1992) as cited in Sauvé, 1996): the rational "paradigm"; the humanistic "paradigm"; and, the inventive "paradigm".

These approaches offer differing educational visions and shape educational choices in the discourse and practice of environmental education. For instance, the rational "paradigm" views nature as being dominated by humans/society and emphasizes the use of pre-structured and expert-driven learning as happens in the case of transmission of formal knowledge in schools.

The humanistic "paradigm" places emphasis on optimal personal accomplishment and learner-centred educational strategies. The inventive "paradigm" is an emerging approach, which calls for critical construction of knowledge and concrete actions at the local level through co-operative learning.

The inventive educational "paradigm" fits best with community-based environmental education and focuses on the symbiotic relationship between humans, society and nature. It recognizes the value that different knowledge systems, including local knowledge, bring to the critical construction of knowledge. It focuses on collaborative learning, which offers choices for collective decision-making and problem-solving for a given local environmental issue. A focus on community-based and local environmental issues is congruent with the socially critical approach to environmental education (Robottom & Hart, 1994) that draws its conceptual underpinnings from critical pedagogy (Freire, 1968, 1985).

The desired result is the empowerment among students and teachers to bring about social transformation and change on the basis of democratic and socially just ways. In the Indian context, Gandhi's philosophy and political activism are reflected in the Freirian critique of formal education as a tool of oppression and political power. This vision gave birth to the alternative model for basic education, *nai talim,* which revolves around local knowledge and practical experience and emphasizes the importance of regional languages (Chand, 1996).

Studies of the socially critical approach to environmental education have been primarily theoretical (Robottom & Hart, 1994) or centred on

"school" and schooling practices (Sammel, 2001). Environmental education is not limited to improvement in the knowledge, skills and attitudes of young children in schools but extends to the design and implementation of pedagogic strategies for local communities and schools (Dillon & Kelly, 2002). One of the ways to address this challenge for formal environmental education is to build on local knowledge systems - a valuable resource used by economically poor communities in their own survival (Gupta, 1999) and sustainable management of local biodiversity (Berkes, 1999).

**Trends in approaches for linking community-based and formal environmental education**

While the combining of local knowledge with formal systems of knowledge is difficult (Aggarwal, 1995), it does present a way foreword to make environmental education effective and practical. The literature on ways and means of facilitating such fusion is scanty (CEE, 1999; Semali & Kincheloe, 1999; Gardner & Shukla, 2002) and largely focused on non-formal environmental education programs for high school or post-secondary education. Some such programs seem to have evolved from the "camping programs" of the 1980's in North America, perhaps as a response to dissatisfaction with "science" focus of environmental education and its lack of social relevance (Dillon & Kelly, 2002).

The North American Association for Environmental Education has designed community and school outdoor education programs which have become a popular means of incorporating environmental education in formal curricula (Lori et al, 1988). Well-known examples from North America, such as the Rediscovery program in Canada (Henley, 1996) and Foxfire in United States (Starners, 1999), as well as similar initiatives from Europe (CERI, 1991) and Asia (Chand & Shukla, 1998), demonstrate how students, teachers and communities have successfully joined hands, shared their knowledge and established common grounds for communications and engaged in reciprocal learning in some innovative ways.

The combining of local knowledge systems with formal curricula in India has been attempted primarily by development NGOs and a few isolated but motivated educators. For example, the Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI), an Ahmedabad-based NGO, documents, disseminates and adds value to knowledge and informal institutions at the grassroots among tribal and poor communities across India through innovative methods like biodiversity and recipe contests (SRISTI, 1994).

The Centre for Environment Education (CEE), an autonomous organization supported by the Ministry of Environment Education, Government of India, has reviewed the primary school level curriculum for environmental education in order to recognize and support innovative

programmes and initiated efforts to correct inadequacies through programs like BAIDIK[1] (CEE, 1999). The Hoshangabad experiment in Madhyapradesh implemented by the local NGO *Ekalavya* in collaboration with university scientists emphasized the use educational aids made from local and low-cost material as well as learning from rural communities' daily life experiences. This experiment was expanded to more than 500 schools in the state by mobilizing political support from the State Government and is being considered a successful educational reform with regard to teaching science in schools (Rampal, 1994).

In the field of school-based environment education, a practical course titled "Our land our life" was designed and implemented by the Uttaranchal Environmental Education Centre in 1987 in the Himalayan region with the help of state and national departments of education.

This course encourages high school students to engage in solving local environmental problems, such as land degradation, by using local knowledge of elders in the villages and concepts learned through formal environmental education in schools. It is now expanded to over 530 schools in Uttaranchal covering more than 68,000 high school students (Pande, 2001).

These initiatives have demonstrated that local ecological knowledge can communicate and collaborate with village-level formal institutions such as *panchayats* and schools, thereby creating a form of socially critical environmental education that may enhance biodiversity conservation. With few exceptions, these efforts have been limited to short-term projects and have not become a regular part of the mainstream or formal education.

One of the important reasons is that the design of effective environmental education and communication strategies that brings together the local knowledge experts and those responsible for planning and implementing the formal curricula (e.g. teachers/curriculum planners and administrators) is extremely difficult.

Lessons for developing and implementing such innovative community-based environmental education strategies can be learned from context-specific experiments and approaches. Three such environmental educational approaches are presented in the next section as case studies.

## Field research: communities and methods

### Selection of the villages and communities

Before the start of field activities, a series of consultations was held at the Centre for Community-based Natural Resources Management at Natural Resources Institute (NRI), University of Manitoba, between April

1. The BAIDIK (Biodiversity Awareness Integration through Documentation of Indigenous Knowledge) initiative implemented by CEE has noted that knowledge regarding ethno–botany, plant-based home remedies and eco-indicators were recurrently reported by children of five different agro-ecological zones in India.

and October 2003 as a part of the Equator Initiative of the United Nations Development Programme.

This helped in the selection of communities, field research methods and research objectives. The Rural Communes' Medicinal Plant Conservation Centre (RCMPCC) of Pune, India was one of the four selected Equator Initiative sites selected as part of the team research study at NRI. A second organization selected for this specific study was SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions), based in Ahmedabad, India.

SRISTI was selected considering past association, working relationship and its outstanding work in the field of developing and experimenting with community-based approaches to the documentation and dissemination of traditional knowledge and grassroots innovations.

The purpose, objectives and research design to suit the interactive adaptive approach as suggested by Nelson (1991), were shared with key leaders and field staff of RCMPCC and SRISTI. Two villages (Amboli and Baripada) from Maharashtra were chosen for the field research, based on three criteria, as follows. The purpose and objectives of the research were shared again with local villagers of Amboli and Baripada through inception workshops in local languages.

*a) Willingness of the community/project functionaries to participate*

Since the research interventions demand frequent and close contact with the community, the researcher lived in the villages. The willingness and consent of villagers were ascertained and obtained in local dialects during inception workshops in both villages which were attended by village panchayats or local management committee members.

Special efforts (e.g. personal visits or informal conversations while walking in forest) to ensure participation of groups such as women and healers were also made.

*b) Presence of a school in or around the village*

Considering the objectives, scope and methods of research and the feedback of villagers and NGOs, the secondary schools were thought as appropriate formal institutions for research activities. However, in the case of Baripada, a secondary school from the neighbouring village of Bopkel (located at a distance of 6 km from Baripada) was chosen because of:

- the absence of a secondary school in Baripada
- the preference of Baripada community leaders
- the encouraging response by the school management at Bopkel.

*c) Evidence of use of local knowledge in sustainable management of local biodiversity*

Amboli and Baripada have well-documented evidence for their community-based conservation efforts both in local media and community-based conservation databases of RCMPCC and SRISTI.

RCMPCC has created Medicinal Plant Conservation Areas (MPCA), local management committees (LMC[2]) and self-help groups (SHG) for women residents in Amboli and twelve other locations of Maharashtra for which it was honoured under EI program of UNDP in 2002.

Amboli has been considered as one of the best MPCAs by RCMPCC (RCMPCC, 2003).

Baripada was recognized by the International Fund for Agriculture Development in 2003 for its outstanding work in conserving the local forest owned by the State Forest Department.

| **Characteristics** | **Amboli** | **Baripada** |
|---|---|---|
| *Population* | 3647 | 786 |
| *Social groups* | Two groups: *Marathas* and *Gurav* considered as higher castes. About ten percents of lower castes include *dhangar, chamar, jadhav* etc. | All tribal. But two main groups are *pawar* and *chaure*. A small proportion of Bhils also included. |
| *Relationship among social caste/groups* | Marathas and Gurav had a long standing history of religious conflict for old village temple. Social mobility between these groups strictly discouraged. | There is a good trade and social relationship among groups. Marriages can be possible among all community groups. |
| *Altitude* | 690 m from sea level | Around 350 m from sea level |
| *Area Conserved* | 445.28 hectares | 267.63 hectares |
| *Landscape* | Dry Deciduous with patches of evergreen forests | Semi evergreen forest |

Table 1. General description of villages selected for field research.
Source: Compiled based on village records of local Government Revenue and Agricultural Departments**.**

## Research Methods

As mandated by the purpose and objectives of the research and guided by interactive-adaptive approach (Nelson, 1991), the field research has an explicit commitment to create or build on qualitative methods. Semi-structured interviews with school teachers (N=14), selected local healers (N=36) and winners of biodiversity (N=32) and recipe contests (N=23) were conducted to ascertain their views on effectiveness of biodiversity and recipe contests. Extended conversations, informal walks in forest with local

2. The local management committees (LMC) were created by RCMPCC in all thirteen project sites to design implement and monitor various program activities in consultation with RCMPCC and local Forest Department staff. The self-help groups (SHG) are women micro-credit group which were involved in preparation and marketing of herbal products

healers and village children provided useful insights in understanding process of local knowledge transmission.

Field observation and participation in village activities (such as stonewall dams construction or plantation in forest) both at Amboli (January to March 2004) and Baripada (September to November 2004) helped in gaining closer interactions and triangulation of data.

SRISTI has developed and successfully used innovative participatory methods such as biodiversity contests (Chand, Shukla & Gupta, 1997) and recipe contests (Honeybee, 1999; Shukla, 2004) to document and disseminate traditional knowledge of school children and women in rural and economically poor regions of India. The researcher has used these methods while working with SRISTI during 1996-2000 (Chand & Shukla, 2004). The methods were explained to local villagers and school teachers and were locally adapted on the basis of their feedback. The idea of a community plant diversity register was developed by the villagers of Baripada after learning about the success of the community biodiversity register in Southern India (Gadgil et al, 2000).

## Community-based environmental education: case studies

### Biodiversity Contests

Biodiversity contests focus on children and their traditional ecological knowledge. The philosophy that guides the contests is that children are the future guardians of biodiversity conservation and resource management at the local level.

The children therefore should be sensitized to the value of local natural resources (in this case, plants) and associated local knowledge that they informally acquire on their own, from family members and healers.

The specific purpose of the contests organized in this study was to identify and document knowledgeable children and local healers in the communities and through their perspectives understand the biodiversity contests role as a pedagogical tool for bridging local knowledge and school-based environmental education.

### The process of Biodiversity Contest

A biodiversity contest was organized on 23$^{rd}$ January 2004 in the Amboli secondary school. An initial round of meetings with teachers was held on 8$^{th}$ January 2003 to discuss the idea and logistics of the contest. Pamphlets describing the contest in Marathi were distributed to all school children almost two weeks in advance. In addition, individual visits were made to different classrooms to explain the process of participation and seek the consent of participants. To participate in the contests, children were expected i) to make a list of names of as many plants that they know, ii) to chronicle the local uses (including medicinal) of the plants and iii) to

indicate the sources that they consulted to learn about the plants. A separate meeting with the teachers was organized to assess their willingness to help organize the contests.

The student participants were evaluated on four criteria:

- The number of plants listed
- The number of plants for which uses were described
- The presentation style
- A knowledge test (skill in identification, medicinal and other uses of plants and habitat).

Following the suggestions made by LMC members and school teachers, the idea of children bringing plant specimens to the committee was replaced by extended knowledge test in order to avoid over-extraction of plants, particularly rare species. The local forest staff provided samples of herbarium sheets, which were used to test identification skills of the participants. Class-wise evaluation committees were formed. The typical evaluation committee had 4-5 members, comprised of a teacher, a local healer, a Forest Department staff person and a member of LMC or SHG.

The participants were judged and ranked independently by all members of the evaluation committee in each class. The class-wise winners were decided on the basis of the highest mean ranks, calculated separately for the boys and girls.

Winners were awarded prizes in the form of teaching-learning material during a special cultural event organized by the school and village.

The contest in Baripada was organized in the government residential school of Bopkel village on 24th September 2004. The process of conducting the contest was same as at Amboli. The orientation of teachers and school children was conducted through a workshop and class-wise instructions on 6th September 2004. The local healers and members of local Forest Management Committee of Baripada were also involved in the evaluation committee.

In Amboli and Baripada, the primary schools were inspired by the contests and subsequently organized similar contests with some modification in the methods. For example, the primary school of Amboli encouraged its students to bring parts of the plants. While in Baripada, the knowledge of primary school children was tested on the specimens brought by the local healers.

## Outcomes of the Biodiversity contests

A total of 406 students from primary and secondary schools at Amboli (N= 269) and Baripada (N= 269) participated in the contest. In addition, school teachers (N=20), local healers (N=6) and local community members (N=19), including the members of local forest management committee and self help groups, took part in the contests as observers and members of evaluation committees. The average number of plants listed in Amboli was 101 and plants described along with the details such as uses and

habitat was 22. Although the average numbers of the plants listed by the girls were almost the same as the boys, the girls demonstrated more detailed knowledge with regard to the use of plants (Mean=25) than boys (Mean=19). In Amboli, a grade 7 girl made a list of 290 plants along with their uses and their preferred habitats, while a grade 5 boy listed 475 plants. On the whole, the children that participated in the contest exhibited a rich knowledge of local plants.

As a follow-up to the contest, a one-day interactive forest walk/workshop (guided by local healers) was organized with the participation of school teachers, winners of the contests, women from SHG and community members. In Baripada, an educational tour in the village forest with local healers and teachers took place, in which students gained skills in identification, use and habitat preferences of certain common medicinal plants.

The dialogue and display of plant lists and specimens from the contest was organized in an open space in the school or village common place. This was perceived as a useful educational idea by students, teachers and community leaders particularly in expanding knowledge of local plants and verification of medicinal uses of certain plants. These outcomes facilitated meaningful interactions among students, local healers, teachers, village forest staff and community leaders who collaborated to develop an action plan for conservation and regeneration of rare medicinal plants in Amboli. The contest provided a platform for recognition of village healers and expanded the use of their knowledge in village schools.

## Recipe Contests

### The Recipe contest: Concept and Process

The idea of a recipe contest was conceptualized and implemented by SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions) based at Ahmedabad (Honeybee, 1999; Shukla, 2004). Recipe contests were designed mainly by and for women to document their local knowledge about uncultivated plants used to make local dishes with some medicinal or health value and which can enrich the taste and provide incentives for their conservation. The recipe contests organized for this research aimed at documenting women's knowledge of medicinal and food related uses of cultivated and uncultivated plants. The first contest was organized in the months of February 2004 at Amboli and the second was organized in August 2004 in Baripada.

The process of organizing the recipe contests was same in both villages. The idea and methods of participation were conveyed to the village women through local language pamphlets and small group meetings with community leaders and members of SHG and LMC. The members of SHG and LMC provided useful feedback on organization (e.g. logistic arrangements and timing of contests) and expressed their willingness to

follow up with village women to encourage their participation. Interested members were also involved in the evaluation committee. The recipes were evaluated on the basis of following criteria:

- Number of recipes brought
- Number of ingredients/plants used in the recipes
- Taste
- Significance of recipes (medicinal or/and nutritional value)
- Use of uncommon/ wild plants in the recipes.

Four to five evaluation committees (depending upon the expected numbers of participants) - each having 2-3 members - were formed. The typical evaluation committee included: a local woman healer, local NGO representatives, community leaders, school teachers and members of SHG and LMC.

On the day of the contest, participating women and girls brought the dishes prepared from the recipes and written descriptions on methods of preparation. After registration, the participants were randomly deployed to the evaluation committee with their recipes. Besides the set criteria, the committee members evaluated the participants by posing questions about the recipes that were displayed at a common place in the villages. The evaluation took almost three hours, followed by a half an hour community lunch programme in which all the dishes were included. The committee members also gathered informal feedback (such as taste of the dishes) from community leaders and villagers. The committee members then finalized their evaluation and passed these on to two people, consisting of a senior community leader or healer and a village school teacher who were independently observing the whole process. The average marks for all participants were calculated and the ten highest scores were chosen as the winners. Winners were rewarded with the prizes in the form of kitchen [3]utensils and certificates by a senior official from Forest Department and village community leaders in the public function.

## Outcomes of the recipe contest

More than 87 (N=42 in Amboli, N=45 in Baripada) women participated with 153 recipes (N=57 in Amboli and N=96 in Baripada). Besides women, the contest elicited participation of local community leaders (N=6 in Amboli, N=7 in Baripada) local healers (N=6 in Amboli, N=8 in Baripada), school teachers (N=3 both in Amboli and Baripada) and village youth (N=9 in Amboli and N=10 in Baripada). The range of recipes/dishes included:

3. The funding support from International Development Research Centre (IDRC) and Social Sciences and Humanities Research Council (SSHRC), Canada, in conducting these field research activities is gratefully acknowledged.

- Unknown wild and/or known plants
- New recipes from known plants (which have either nutritional or medicinal values)
- Known recipes with wild plants as an ingredients (spices or as a separate addition for taste or flavor purposes)
- Known recipes/dishes with different methods of preparation emphasizing the use of locally-grown wild or lesser-known plant-based ingredients.

Although most women brought one recipe/dish, the number of plants used in the recipes in some cases went beyond 30 and in one case up to 42 in Amboli. Many participants were surprised by the nature and variety of different wild plants, which were seemingly looked upon as "weeds" but turned out of having great local medicinal and nutritional values.

Even though, some of the recipes/dishes were same and commonly known, their methods of preparation, tastes and uses (nutritional and medicinal) were distinct.

The display of recipes/dishes provided an opportunity for informal knowledge exchange. The participants shared their recipes in spontaneously formed interest groups of village women and men. The evaluation was slightly modified in Baripada with more weight placed on two criteria, taste and number recipes/dishes. In the earlier contest, emphasis on testing knowledge and ranking based on medicinal/nutritional value of the plants restricted the scope for village-wide sharing and exchange of knowledge about common and uncommon local wild plants. Considering the interest, more time was devoted to women to women exchange and interactions among villagers about the recipes in Baripada. The local healers (both male and female) had final authority in deciding the significance of the recipes based on their medicinal or nutritional values, local availability and the conservation status of the wild plants. For example, a wild plant locally known as *Nargoot* is not commonly available in and around Baripada and few women had to walk deeper (22 km) into forest to locate such plant species. Recipes with such locally unavailable and rare plants were more valued in evaluation.

Most of the women who participated had learned these recipes either through their mothers or close relatives, in most cases females. In addition, they also widened their knowledge about plants through informal networks with elder women in and around village, known through their personal contacts and informal conversations during their domestic chores in the forest. Deriving inspiration from these contests, the local SHGs of Amboli and RCMPCC decided to organize recipe contests in different seasons to capture the seasonal variability and availability of wild vegetables.

In Baripada, the enthusiasm and positive feedback from villagers motivated a local NGO, Jan Seva Foundation to organize the recipe contest on annual basis.

## Community-based Plant Diversity Monitoring Register

### Origin of idea

The idea of a community biodiversity register originated as the Peoples' Biodiversity Register Program by a few NGOs in southern India (Gadgil et al, 2000).

The Peoples Biodiversity Registers Program encourages and builds capacities of local communities in monitoring the local biodiversity through a local language register. This register is kept at a public place for easy access by villagers and may serve as a tool for protecting the intellectual property rights of village communities. The residents of a village or a group of neighboring villages document the human uses (livelihood-related and others such as medicine) in their registers, which is maintained and updated annually (any convenient regular interval) for monitoring and sustainable use of local biodiversity.

When these experiments were shared with local villagers of Baripada during the inception workshop, the villagers decided to test the idea of community-based plant diversity register, with a focus on only plants.

### The community-based plant registers: process and outcomes

This initiative was a follow-up to a community effort to protect village forests, which was originally targeted to deal with the crisis of shortage of firewood, food and water in nearby forests of 445 hectors as a result of indiscriminate cutting of teakwood trees by outsiders. A village youth from Baripada had mobilized the community and formed an informal village forest protection committee in the year 1993.

The committee had crafted and enforced an interesting set of access, resource-use, and conflict-resolution rules to prevent pressure on this forest[4].

The Forest Department, after realizing the community spirit, legitimized the informal village forest protection committee into a Joint Forest Management protection committee in 1999. The results were revealing and brought an international recognition when Rome-based International Fund for Agricultural Development (IFAD) honored them for their outstanding community-based conservation and development work in 2003. After this success, the villagers realized the need for continuous monitoring of the plant diversity within the forest and the need for collection of baseline data on plant diversity.

They were all preparing to the next stage was of community-based management the plant diversity with forest department. This led to a joint exploration by local youths, healers and university teachers of Botany

4. For description on these rules, please see Honeybee, Vol.15 (2): 7-9

and Zoology from Pimpalner and Sakri towns for collaborative learning about mapping of plant diversity.

In September 2004, a focus group discussion was held among all partners to decide on a site for a demonstration. An area of 0.50 acre with dense mixed vegetation was identified by the local healers of Baripada village and a team of scientists. After careful consideration of potential sites, it was finalized that a plot of 10 sq meters would be ideal for laying down the quadrant. The skill of marking, plotting and recording of plants in zigzag fashion was demonstrated on selected pilot site. It was decided that individual healers and village youths with good knowledge of local plants and their habitat would carry out the recording of observations.

A simple code of conduct was developed and followed. For example, each local healer would take turns in counting the number of the plants that s/he first reports. Once s/he had completed the counting of a particular plant, s/he would then move to next plant that had not been reported. The botanists and zoologist guiding the exercise, decided to record the information in Marathi language. Each plant should be collected with flower and fruits for easy identification.

The order of counting should be from smaller size to bigger ones (first creepers and lastly trees). After the counting was done for all plants, all the members of a team moved randomly with in plots so that any unlisted plants should not be left out. The forest protection committee after couple of meetings with local healers and shepherds finalized the 14 different sites capturing geographical variations as sample. From each such site, three plots (10 sq. metres each) would be laid. Three teams of fifteen people (each having five members including local healers, village youths and members from forest protection committee) were formed. Within two weeks, the benchmark vegetation mapping of all 14 sites was completed.

The register was formally inaugurated at a village workshop in October 2004, that was attended by local healers, primary school teachers and children, forest staff, Ayurvedic practitioners, government officials from the District Agriculture Department and local NGOs. It helped generate useful policy recommendations for community-based conservation. Some simple rules for the access and use of the information provided in community register were also formed.

The villagers have decided to monitor the status of plant diversity every two years from the same sites.

**Features of Environmental Education in three approaches**

The environmental education features and strategies as revealed and highlighted by biodiversity contests, recipe contests and the community plant diversity register have some common threads, as indicated in Table 2.

Keeping the target groups informed from the inception of the program, through a mix of locally appropriate communication media is the most common strategy used by three methods.

Since these methods were primarily targeted at different stakeholders, their priority of removing specific barriers also changed. For example, the biodiversity contest was designed for school children and targeted at informing, interacting and transforming school-based EE, while the recipe contests were targeted at facilitating intergenerational transmission and recognition of commonly-discounted women's knowledge systems in local conservation agendas.

Use of local language and resources, creates platforms for dialogue among multiple stakeholders, encouraging intergenerational interactions by building upon local knowledge systems are prevalent strategies for achieving effective community-based environmental education.

Interestingly, all three approaches have consider conservation of local natural resources through either village action plans, collaborative learning (biodiversity contest), development of positive attitude towards wild vegetables (recipe contest) and a community level record for monitoring of village forest and plant species (community register).

| | **Biodiversity contest** | **Recipe contest** | **Community register** |
|---|---|---|---|
| *Communication Strategies* | – Printed pamphlets and verbal announcements followed by informal discussion with school children and walks.<br>– Orientation to teachers<br>– Orientation to local community leaders including local experts<br>– Language (regional) | – Printed pamphlets & verbal announcements followed by informal discussion with women<br>– Orientation to local groups such as SHG<br>– Orientation to local women experts and community leaders<br>– Language (regional) | – Orientation to village community leaders and local healers<br>– Discussions with formal scientists such as botanists and ecologists<br>– Local demonstration and hands-on training<br>– Language (regional) |
| *Targeted Audience* | – Primary school children and girls in rural and tribal areas<br>– Local ecological experts such | – Rural & tribal women particularly<br>– Illiterate girls and women<br>– Village Women's groups | – Educationally - disadvantaged rural and tribal communities<br>– Local healers and un-employed village youths<br>– University |

| | | | |
|---|---|---|---|
| | as healers<br>– Primary school teachers | | scientists and NGO representative |
| *Outcomes* | – Engaging local participation of less-articulate (healers and educationally -challenged children)<br>– Collaboration of multiple stakeholders (e.g. teachers, local healers and school children) having varied interests and knowledge<br>– Recognition of local knowledge systems<br>– Exchange and positive action between local knowledge and school-based knowledge for ensuring local conservation<br>– Educating school-based environmental education by chronicling local uses of plants (such as eco-indicators) and collaborative action with | – Recognition to women's local knowledge<br>– Engaging local participation less-articulate and weaker (women particularly tribal and from weaker social groups)<br>– Collaboration of multiple stakeholders (e.g. knowledgeable elder women, community leaders and village women groups) having varied interests and knowledge<br>– Develop and sustain interests of village youth in local plants by promoting intergeneration al transmission | – Platform for exchange between local knowledge and formal knowledge for ensuring local conservation<br>– Educating forest department by chronicling local uses and monitoring of plants leads to collaborative action for sustainable co-management<br>– Recognition of local knowledge systems<br>– Develop and sustain interests of village youth in local plants by promoting intergeneration al transmission |

| | | | |
|---|---|---|---|
| | communities for conservation<br>– Develop and sustain interests of village youth in local plants by promoting intergenerational transmission | | |
| **Local**<br>*Action and lessons for policy reform* | – Enriching classroom learning through hands-on experience<br>– Institutionalization as co-curricular activities by school<br>– Village Action plan for conservation and monitoring of medicinal plants | – Institutionalization of activity by local organizations and village institutions<br>– Promoting sensitivity towards and use of wild vegetables<br>– Local health improvement | – Monitoring of local ecosystem<br>– Monitoring of plant species<br>– Village community register as a common property<br>– Mutual Strengthening of skills among healers, scientists and local youth |

Table 2. EE features revealed by three approaches used in two villages

## Conclusions and policy implications

The socially critical approach is useful for understanding and promoting community-based environmental education. If it builds on informal, local knowledge systems it can make an important contribution to environmental education in the formal setting of school curricula. Experiments in India suggest that efforts have been made in this direction but they have been limited in scope and longevity. In this paper, we have described community-based biodiversity contests, recipe contests and plant diversity registers. It has been demonstrated that these initiatives, as examples of local knowledge systems in practice, can inform, interact with and transform formal systems. They can connect the holders of local

knowledge systems, such as children, women and elders, with teachers in schools in collaborative and cooperative learning and action.

The key contributions by these activities are their reliance on practical local knowledge, their direct approaches to communication of knowledge across generations and their linking to formal knowledge systems. Biodiversity and recipe contests are process-oriented methods, which help create platforms for future actions, while the community-plant diversity register is a more action-oriented technique which helps in recognition of local knowledge and contribute to sustainable management of local biodiversity. Biodiversity contests, recipe contests and plant diversity registers are means and not ends and therefore require constant experimentation and innovation appropriate to different ecological and socio-cultural contexts.

One of the key educational features demonstrated by biodiversity and recipe contests and community plant diversity is recognition of local knowledge systems. Local knowledge therefore should be made an explicit component of socially critical approaches to environmental education. At the village level, schools can initiate, experiment and encourage community-based environmental education and generate outcomes envisioned in socially critical approaches to environmental education. The schools that participated in the study had shown some motivation in continuing these approaches as avenues to enrich formal learning through regular co-curricular activities (school herbal gardens at Amboli and creating opportunities of exchange between local healers and students in Baripada). These efforts need to be reinforced in schools to promote critical thinking, action and transformation through involvement of children, teachers, healers and community leaders. At the macro level, the school-related policy in general and discipline-oriented formal environmental education policy in particular need to be reoriented. For instance, in the three community-based examples, the proactive role of schools in building long-term partnerships with village-level institutions is not forthcoming. Such partnerships, if developed can generate critical understanding and positive action (such as sustainable use and conservation) towards local biodiversity issues.

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# RE-VISIONING LEARNING WITHIN LOCAL KNOWLEDGE SYSTEMS: IMPLICATIONS FOR FORMAL ENVIRONMENTAL EDUCATION

**Shailesh Shukla**
*PhD Student, Natural Resources Institute, University of Manitoba, Canada*
**P.G. Vijaya Sherry Chand**
*Faculty Member, Indian Institute of Management, Ahmedabad*

## Abstract

Learning within informal settings of local communities (especially indigenous groups) continues to remain less understood and celebrated. Theories of learning developed within and applied to formal education settings have been applied to study learning in informal environments, but the notion of "informality" constructed by these theories emphasizes the role of informal learning in serving the purposes of formal education practices. This inherent bias of learning theories towards formal systems undermines the learning that happens in the informal knowledge systems.

The process of knowledge acquisition and transmission in informal knowledge systems such as traditional ecological knowledge (TEK) may need a distinct conceptual framework to explain the nature of learning that results. This paper attempts to outline a framework of learning in TEK, a sub-set of local knowledge systems, by using the example of "biodiversity contests" held in Western India.

These contests aim at uncovering, in a healthy competition mode, the ability of children to articulate their knowledge about local plant diversity. SRISTI, a nongovernmental organization (www.sristi.org), formulated the initial idea of the contest. This paper draws on the findings from 49 such contests conducted in the rural areas of Gujarat, India, during 2001-2002, in which more than 1600 children participated.

We identify the learning features and strategies along four major dimensions: sources of knowledge, context/settings, methods of learning, and criteria of selecting the learners to determine the purpose of learning.

Finally, we explore the scope for integrating informal experiences of children and informal learning into formal environmental education.

## Learning Theories: Changing Meanings

Early western philosophy focused on three epistemological perspectives on learning (Scheffler, 1965): the rationalistic, the empiricist, and the pragmatist. The rationalistic perspective privileges the brain and

intuition as major contributors to learning. Its emphasis on human reason did not recognize realistic experience-based learning, both formal and informal. Later, learning theorists like Piaget (1964) stressed that learning happens by the learners' own efforts and that it could be informal as well. The role of the external environment as an important contributor to learning, and thereby reality getting constructed "objectively", was the idea proposed by the empiricist perspective on learning. The empiricist ideas of the Eighteenth century in Europe (for instance, those advocated by Berkeley and Hume in Atherton, 1999) suggested that the new experiences of learners (guided by teachers) helped in learning. This epistemological foundation also provided a basis for the behaviourists' theories of learning, starting with the original contributions of Skinner (Gowin, 1981). The behaviourists argued that learning results in visible changes in behaviour towards "pre-fixed" objectives, and could be guided or facilitated by teachers. Behaviourist theory and empiricist philosophy emphasize the one-way transmission of an idea from the teacher to the student. The more recent pragmatist view is grounded in the contributions of John Dewey in North America (Dewey, 1938). Pragmatism combines selected features of empiricism and behaviourism and can be described as "learning by doing" in the context of society. Experiences and practices do shape realities, but these experiences also happen in social interactions.

Pragmatism also corresponds to "cognitism" (Ausubel, 1963), which views learning as triggered by "symbols" external to individuals and can result in new understanding or new knowledge but may not necessarily change behaviour. Later on, the theories of social development proposed by Vygotsky (1978) supported the pragmatist view. Simple transmission of fact, according to social development theory and pragmatism, is not desirable. The teacher's or the facilitator's role becomes very critical in maintaining a balance among assisting students in generating ideas, helping them take action, and helping the change to be seen in the context of social interactive mechanisms. The reality is thus negotiated in the communities in which learners or students interact.

Later, some scholars coined an inclusive term, constructivism (Bruner, 1966), to include both pragmatism and rationalism. The hold of rationalism and empiricism as the two major epistemological traditions of learning is however strong, even though Piagetian ideas could be considered a way forward to constructivism.

The different ways of understanding learning are becoming competing perspectives due to the enrichment of the field; however, the distinctions among the three continue to remain fuzzy (Farrah, 2001).

Constructivism's socio-cultural focus has influenced recent work on theories of learning. This has resulted in two important shifts. Firstly, there is an increasing emphasis on "informal experiences" that children imbibe from adults and community members. Secondly, there is a growing attention

to "informal learning", in addition to the focus on school-based or "formal education" and "non-formal education".[5]

The privileging of informal experiences happening during socio-cultural interactions, is evident in recent work in education and psychology, like the theories of situated cognition (Lave and Wenger, 1991), communities of practice (Wenger, 1998), apprenticeship learning or learning through "rich context" (Brown, Collins and Duguid, 1989; Rogoff, 1990), collateral learning (Jegede, 1995) and social learning (Ingold, 2000). On the other hand, the term "informal learning" has started appearing in the specialized field of adult education. Livingston (2001) defines informal learning as

> any activity involving the pursuit of understanding, knowledge and skills which occur outside the curricula of educational institutions or the courses or workshops offered by educational or social agencies.

University-based networks like the "New Approaches to Lifelong Learning" at University of Toronto in Canada have also systematically studied "informal learning".

Schugurensky (2000) has proposed a taxonomy of informal learning, based on the "intentionality" or purpose of learning and an individual's appreciation of the learning experience or "consciousness" which may be seen as the "outcome" of the learning experience. According to this taxonomy informal learning may be self-directed (driven by the individual, who, therefore, is aware of the learning), incidental (without an intended purpose, but with the individuals realizing later that new learning has happened) and socialization (mostly unintended, with the nature of the knowledge being tacit, but the skills/knowledge/understanding being internalized through daily living experiences).

The features of informal learning (objectives, contents, means and processes of acquisition, duration, evaluation of outcomes, applications) are decided by the individuals and groups who engage in it. The explicit recognition of the potential of "informal learning" (Pitanwanakwat, 2001) has followed its implicit recognition by socio-cultural learning theories. The field of "informal learning", however, is still to be adequately researched; it is often neglected (Schugurensky, 2000). The ideas of learning from the community, learning processes within the community, and learning from the everyday lives of people, have in fact provided avenues for the growth of concepts like local knowledge and the emergence of "traditional ecological

5. Formal education is usually characterized as a progressive ladder of structured education taking place usually in classrooms/colleges, with sophisticated and time-bound evaluation. Non-formal education programs are semi-structured and targeted at particular groups of people, and are usually designed to impart skills, with or without structured evaluation. Adult literacy education would be an example.

knowledge" (TEK) (Berkes, 1999). These are now key concepts in the fields of natural resources management and environmental education (EE).

## Learning in Environmental Education (EE)

The learning theories and ideologies, in general, have had the same order and degrees of dominance in EE as they have had in other fields. For example, the research on learning in EE in North America in the 1970s and 1980s was mostly influenced by the behaviourist approach, and then by the empiricist and pragmatist ideologies in the 1990s. The learning models of constructivism however began to appear in the mid-1990s (Robertson, 1994; Robottom and Hart, 1993). In her extensive review of the philosophy, the policies and the programs of EE in various countries Palmer (1998) suggested that while formal EE programs are important, they are not sufficient to bring about changes in the attitude towards the knowledge of, and the motivation to take, positive environmental action.

Underscoring the significance of other "informal" influences in the lives of the people, she placed these at the core of the teaching/learning model of EE. These "informal" influences often come from and through the learners' interactions with the environment and the local communities, in the context of real life experiences. Parallel to this reworking of formal EE, TEK emerged in the field of development and natural resources management (Berkes, 1999). Scholars define TEK in a variety of ways, but it encompasses the following features:

- It is a cumulative body of knowledge, practices and beliefs
- It is "generative", through the use of adaptive processes
- It is multigenerational and depends on cultural transmission (Berkes, 1999).

TEK is also considered as a sub-set of indigenous knowledge, which is commonly defined as unique, traditional, 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). Ironically, despite the usefulness of TEK in the field of natural resources management and development, its relationship with formal education systems has been tenuous (Semali and Kincheloe, 1999). The persistent neglect of local knowledge systems by "dominant" power structures of formal education has been noted to have deep-rooted ideological backing (Freire, 1968; also evident in the political action of Mahatma Gandhi [Chand, 1996] and Nyerere [Semali and Kincheloe 1999]). In fact, synthesizing formal education and TEK in order to create mutual learning and change has been considered as a "systemic challenge" (Dei, 2000), and viewing the "learner as an active creator of knowledge" has been further refined through a socially critical perspective - "reconstructive" learning - so that a different kind of educational change becomes possible.

Rickinson (2001), conducted a detailed review of the research on learners and learning in EE by examining more than 100 journal articles, books and reports published between 1993 and 1999, and identified three weaknesses:

- Less diverse research methods and concepts than in the wider field of EE research. The research mainly relied on quantitative evidence (mostly informed by behaviourist and empiricist traditions) and very rarely drew upon constructive or interpretive philosophies.
- Uneven focus. There is a relative dearth of evidence on learning processes as opposed to learning outcomes, educational characteristics as opposed to environmental characteristics and learning as opposed to learners.
- A lack of interconnectedness in the evidence presented on learners and learning, as a consequence of which the indicated future directions tend to emphasize evaluation of EE programs or generating ideas on students' environmental characteristics such as knowledge, attitude and concerns, in contrast to focusing on learners and their learning processes.

While this review is useful in terms of outlining broad directions for future research, some environment educationists like Dillon (2003) consider it "incomplete" and partial. One of the major shortcomings, according to Dillon, is the omission of an emerging body of knowledge on learning from "informal contexts". Learning in informal settings is strong enough to be compared and contrasted with learning in formal contexts. Research focused on informal learning in EE has emerged recently through the study of museums, zoos, and EE or interpretation centers. However, as Dillon argues, the formal-informal dichotomy itself is problematic. Further, the inclusion of the already-existing category of non-formal EE complicates the debate on the formal/informal divide. Dillon (2003: 223), on the basis of a review of informal learning through museums, suggests three areas highlighted by informal learning contexts:

- A conceptual understanding of how learners engage and interact with everyday phenomena.
- Children's perceptions of the range of phenomena.
- Structure and efficacy of pedagogic strategies which involve direct, hands-on experience with an object or situation.

While studies in EE do throw some light on the development of children's perceptions, knowledge of the other two areas is limited. In this article, we address the issue of what informal learning in EE has to offer formal EE and theories of learning.

We offer the following reasons for our approach:

- Informal learning spaces as viewed by Dillon (2003) should not be limited to just "informal contexts" as encountered through museums or EE centers. In economically poor countries, such infrastructure is limited, but the learning that happens in

economically poor but socially and ecologically diverse communities has much to offer (Gupta, 1996). The potential of the local knowledge of such communities has been recognized internationally in the fields of sustainable development and natural resources management.

- A review of the programs and policies of formal EE (Palmer, 1998) suggests that the world's most successful programs in the 21st century are likely to be those in which the formal and the informal elements of education are supported alongside each other. Formal EE can be more effective if it can make use of the prior experiences, often acquired within their communities through informal learning modes (Palmer, 1998; Chawla, 2001), that children bring to school.
- The emerging tradition of socially critical EE seems to provide a useful framework to understand such "informal" learning or TEK. If there is a call for constructivist research in EE, the voices of research based on socially critical traditions are bound to become stronger.
- The learning within communities with respect to their survival and adaptation or to their own local knowledge systems is not very well understood. While there have been some studies on informal learning in museums/ science centers, how the children of adaptive communities socialize and learn within their traditions is an area often neglected in EE (Berkes 1999; Battiste and Henderson 2000). Gaining a better understanding of "informality" would not only help formal EE, but also highlight the features of local knowledge systems that are distinct and are better explained by alternative learning theories.

We now take up the "biodiversity contest" as an instance of creating an informal learning space, located within the context of inter-generational and local learning and knowledge transfer, and as a pedagogical tool that illustrates some of the methods and tools used in informal learning contexts.

Our purpose here is to illustrate the possible links with formal environmental education.

## The Case of the "Biodiversity Contest"

A "biodiversity contest", implemented since 1992 in various parts of rural India, refers to the uncovering of the knowledge of children about local biodiversity through a competition. The definition of biodiversity was limited to plant diversity. Other areas of biodiversity like fauna, were not covered. In addition, the ability of the children to identify the plants in their environment and to explain their uses during oral questioning was taken to indicate knowledge of plant diversity.

The methodology of the contest can be summarized as follows: a pamphlet communicates to children and their parents the concept and purpose of the contest. On a specified day, the children bring specimens of plants with which they are familiar, and answer questions about the uses and habitats of plants. An evaluation committee interviews each child, and assesses the specimens brought and their novelty, and the quality of the answers. The winners get school bags or crayon sets as prizes.

The contests were limited to school-going children and schoolteachers helped in conducting them. We begin with a summary of the findings of the pilot contests conducted in 14 schools in 1995-96, in which 905 boys (38.6 percent of a school enrollment of 2346) and 657 girls (47.2 percent of a school enrollment of 1372) participated.[6] Thus, 1562 children, out of 3718 in the 14 schools (42 percent) participated. The aim of these contests was to generate issues for in-depth examination later. Specifically, academic performance, as measured by the rank obtained by the students in their school examinations over the previous year, was compared with the number of plants brought or listed, which was assumed to indicate knowledge about biodiversity. In two of the villages where herbaria of the samples brought by the children were prepared, about 80 percent of the students contributed five samples each. However, the highest number of samples brought was 35. While 43 percent of the children listed 50 plants or less, 39 percent could list more than 100.

These figures indicate the existence of a rich knowledge base among primary school children, perhaps unevenly distributed, in matters relating to identification and utilization of plants.

Boys seemed to perform better than girls, though later contests indicated that the differences were not significant. The academic ranks (ranks obtained in the latest annual examination conducted by the schools) seemed to be positively and significantly correlated with biodiversity ranks (correlation value of 0.2063, significant at 0.01 level), though the value of the coefficient is small. One reason for this correlation could be the relatively homogeneous environments from which the children came.

The feedback obtained from the 36 teachers who organized the contests indicated an important linkage between the biodiversity contest and the environment subject taught as part of the formal syllabus; the major benefits identified were the identification of alternative knowledge systems and the pedagogical value of the contests, through which it was now easier to "make sense" of the prescribed textual content.

6. These are drawn from an unpublished note by Vijaya Sherry Chand, Shailesh Shukla and Anil Gupta, "Ecological knowledge of rural children: Biodiversity Contests as educational innovation" (1999). The biodiversity contests discussed here have all been conducted by SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutes), a non-governmental organization based in Ahmedabad, Gujarat, India. SRISTI's field staff identified the schools and helped conduct the contests.

With this background, another 49 contests were conducted in 2000-01, in which 1680 children participated. The winners of 31 of the contests could be contacted in late 2002 and they were interviewed to study the process by which they acquired the knowledge, which led to their becoming biodiversity contest winners. We summarize below some of the features of the pedagogical elements of the biodiversity contests (The details have been presented in Chand & Shukla 2003).

In the development of "biodiversity competence", the grandparent, rather than the immediate parent, generation has played a significant role as a source of knowledge and an active transmitter of plant diversity knowledge. Almost all the sources happen to be male. Reproducing this pattern is the process of selection of children as protégés or apprentices by the elders. Boys are chosen by their elders (grandfathers mainly) as apprentices, to receive knowledge. These complementary patterns - males as sources and purposeful selection of boys as apprentices - seems to suggest that at least as far as plant (specifically medicinal plant) knowledge is concerned, the process of selection of receivers of knowledge may be gendered. However, a crude measure like the number of species about which the children are knowledgeable indicates little difference between boys and girls (the mean number of species for boys being 66 and the number for girls being 64). The lesson for curriculum developers is that girls who have had an opportunity to learn within the same indigenous cultures acquire comparable levels of knowledge.

Four unwritten rules used by elders while transferring knowledge to communicate certain values and beliefs are:

- Many herbs cannot be grown near human habitations: the "sanctity of the herbs may be lost".
- Herbs should not be "grown"; rather, they should develop in their natural habitat, and people should "take them according to need".
- "The one who knows about uses of herbs and serves people as a healer should not go alone to collect herbs. He has to choose someone to accompany him." This is important from the perspective of apprenticeship as a mode of education.
- "The first thing we are taught by our mentors is, 'Do not tell this to anyone'".

The first two rules work against conservation of biodiversity. The third indicates the role of apprenticeship. The fourth may sound paradoxical since the same children have shared their knowledge in the contests, but according to the elders, there is no dilemma, since the contests were held in a formal education context. These indicate that formal environmental education can usefully develop communication and curricular strategies to promote active conservation, while retaining the importance of learning from knowledgeable elders who use their own methods of instruction.

Some of the methods used by the teacher-mentors (the elders) include:

- Systematic instruction in identification, attention to morphology of plants, and their uses

- Requests to bring specific herbs/plants
- Observation of use and practice by child
- Questioning about knowledge and to check memory
- Explanation and instruction through "kits" of mentors, developing a "utility perspective"
- Strong encouragement of questioning, a crucial feature of knowledge transmission.

**The Biodiversity Contests and Formal Environmental Education**

Our experiences over many years with the biodiversity contests indicate that the formal schooling system does not usually recognize children's knowledge about local plant diversity, since the competencies demanded by the two systems do not match. However, acknowledging and valorizing the knowledge that children possess because of informal learning within their family/community contexts may help overcome the lack of self-esteem of those children who perform poorly in the formal system.

The contest can also become a tool to re-educate the local community and the children on promoting conservation. Teachers in the formal system become more aware of the alternative pedagogical techniques that help in bringing the outside environment into the classroom; they also reflect more on the local apprenticeship models of education.

Another advantage of the biodiversity contest is that the school can get involved in recording knowledge that is eroding along with the erosion of the natural resources associated with that knowledge.

This is important in inter-generational learning as well. The above are brought together in the following figure (Figure 1).

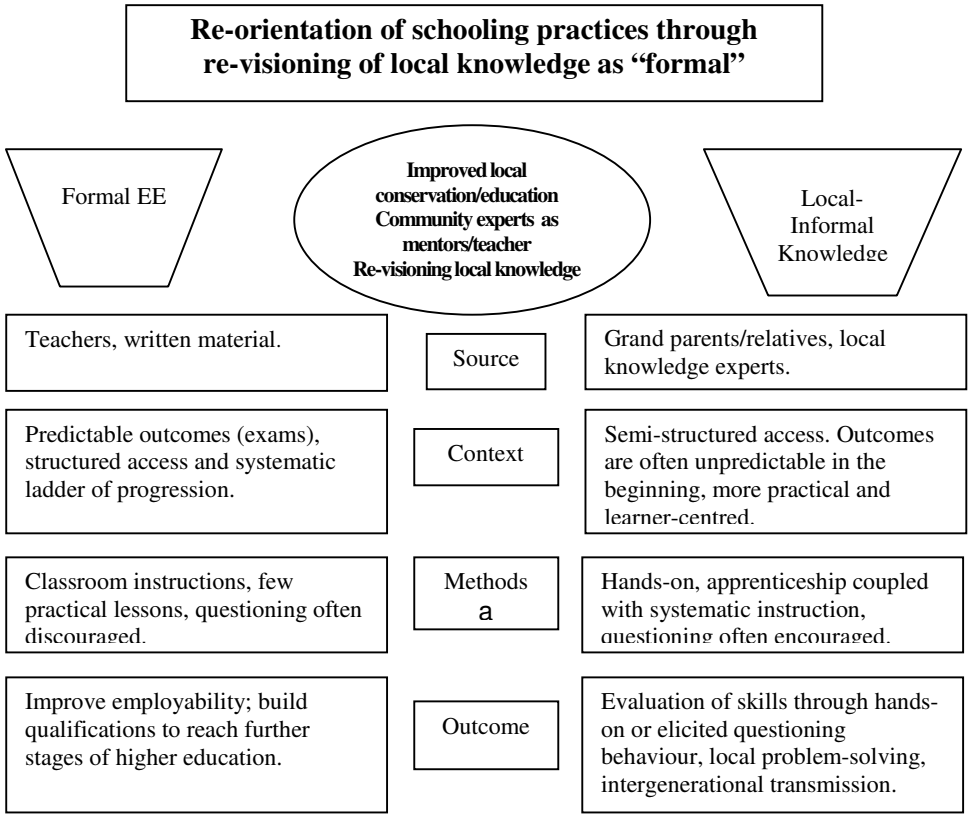


Fig. 1. Links between the formal and informal environmental education systems

We now turn to the implications of the links between formal and informal environmental education systems for re-visioning an integration of formal and informal learning contexts. The identification of particular behaviours of indigenous students about which educators should be conscious while developing educational and motivational strategies for children has had a long tradition (Wax *et al.* 1964; Philips 1972). However, the transmission of indigenous heritage - biodiversity knowledge is an example - to children through the processes of socialization operating in their home and community environments, is still to be understood adequately. This is all the more critical since the linkages between indigenous knowledge systems and natural resources management are well known. At the same time, there is a fair understanding of the mechanisms that facilitate such transmission in non-Indian contexts. These include formal apprenticeship, systematic interactions that use informal processes (Ruddle 1993; Ritchie and Ritchie 1979), and a strong emphasis on observation followed by imitation and discouragement of questioning by

children, with less reliance on verbal instruction. For instance, Ruddle (2000) and Battiste and Henderson (2000) note that the mode of cognitive transmission of indigenous knowledge is primarily oral and intimate. The land-ecology complex has been a central "classroom" site for teaching about knowledge and the heritage of indigenous peoples (Daes 1994).

However, while some attempt has been made to study the mechanisms of transmission of indigenous knowledge, Battiste and Henderson (2000) note, importantly, that a focus on "assimilation" (Johnston 1988; Knockwood 1992; Milloy 1999) may have militated against understanding the transmission of indigenous knowledge *within indigenous traditions*. Berkes (1999: 141) makes a similar point when he notes that ethnographic studies on generation of traditional knowledge (and its transmission) are significantly few in number, and remarks on the "silence" concerning these processes in the field of education.

The biodiversity contests, as reported in this paper, have all taken place in contexts of extreme deprivation. That is, the community itself has been the informal context for learning, in contrast to environment education centers or museums as contextual spaces. The biodiversity contest, rooted as it is in the local context offers local schools a means to re-visualize the informal contexts in which learning can take place. It is a means to valorize hitherto unrecognized knowledge and a means to re-educate the local community and children, thereby enabling them to take action. The contest is thus not an "imposed" tool for environmental education through which outsiders determine the content of knowledge and how it is to be taught; neither is it an exploitative (in a neutral sense) mechanism to just bring out children's knowledge without returning something into the local environment. Thus, the biodiversity contest can be interpreted as an inherently democratic and non-exploitative method of education, rooted in a relevant local context, a method which has potential for leading to environmental action, but also a method that is flexible in that it can incorporate external (and also expert) knowledge at the levels of adding value to children's knowledge and to local environmental conservation plans.

Daes (1994) structures some of the pedagogical elements noted above - apprenticeship, sequential and additive processes of interaction, and observation and imitation - into three elements that form part of a pedagogy operated by the people themselves: apprenticeship, ceremonies and practice. These elements offer a framework to understand the role of elders in the intergenerational transfer of local ecological knowledge. Such an understanding will also help in better appreciating the role of children's "formative experiences and prior knowledge" in transmission of knowledge, from an indigenous perspective. It should also help in re-designing teaching and learning strategies for environmental education, and in developing concepts that more faithfully reflect traditional education transmission processes. These strategies should acknowledge and build on the strong presence of formal "environmental education" in most national contexts. In India, historically, environment education was not taught in primary schools as a

subject. However, there has been a policy emphasis, dating back to the 1960s, on understanding the facts, concepts and processes that are relevant to the "biological environment". A National Policy formulated in 1968 led to the development of curriculum material on environmental education (UNESCO 1985). After 1968, the debate on including environmental education within the ambit of educational policy and curriculum gathered momentum (Pandey 2000; Sharma 1999; Raina 1999). However, national debates have not highlighted the issue of incorporating local ecological knowledge in environmental education in spite of the success of a few initiatives of non-governmental organizations and the efforts of a few motivated educators.

Very recently, there have been some attempts to correct this state of affairs. The Centre for Environment Education (CEE), an autonomous organization supported by the Government of India, has recently initiated efforts to correct certain inadequacies of existing environmental education curriculum through programs like BAIDIK[7] (CEE 1999) at the primary school level and SAMVARDHAN at the higher education level; (see Gardner and Shukla 2002 for details). The NBSAP[8] has noted the scope for creating awareness about biodiversity and its conservation among children and youth in the formal education system. The case of the biodiversity contest reported here indicates that while translating the strategies for application at the local level, teachers will find it useful to keep in mind the framework of Schugurensky (2000), noted earlier. The main forms of learning evident seem to be incidental learning (appreciation of the purpose, but intention not clear) and social learning (intention is unintended and children not being consciously aware). There is an element of self-driven learning, where the intention is clear to the child and the appreciation of learning is present. There is a consensus among many international agencies (UNESCO 1975, 1977, 2005; IUCN, UNEP and WWF 1991) that curriculum and pedagogical practices in which students engage (both individually and in groups) in problem-solving and action-based activities, are desirable. This focus calls for tran-disciplinary, practical and flexible inquiry. School curricula, however, tend to be more discipline oriented and to emphasize abstract theoretical problems. Palmer (1998) in an interesting study of the environmental education programs of several developed and developing countries concluded that the influence of environmental education has not been as effective as it should have been because of two

7. The BAIDIK (Biodiversity Awareness Integration through Documentation of Indigenous Knowledge) initiative implemented by CEE has noted that knowledge regarding ethnobotany, plant-based home remedies and eco-indicators, was reported by children of five different agro-ecological zones in India.

8. The National Biodiversity Strategy and Action Plan (NBSAP) prepared by the Ministry of Environment and Forests, India, with support from the Global Environment Facility (GEF), is a plan for the conservation of biodiversity. Examples of studies that have been taken up include an assessment of species diversity in a city in western India, and a collaborative study with 20 undergraduate colleges on Environmental Quality Monitoring.

principal reasons: logistical problems associate with widespread implementation, and the failure to take into account prior life experiences and knowledge that have been significant for people's lives in terms of understanding, awareness, concerns and actions. The latter reason provides a rationale for enriching formal curricula with local ecological knowledge. In the specific context of biodiversity education, awareness, commitment and innovativeness, have been identified as the key resources for building up biodiversity awareness among school children (World Resources Institute 1992). Novak and Gowin (1984), and Driver (1989), have advocated "meaningful learning" (in contrast to rote learning) on the premise that young children do know about their environment and biodiversity when they enter schooling. Learning will therefore be more successful if teachers can relate to and build upon existing understandings that children hold of the concepts being taught (Palmer, 1993; Palmer and Neal 1994). Gigliotti (1990) notes the absence of ecological knowledge in current environmental education frameworks as a reason for decisions being uninformed and inappropriate. Worse, formal schooling itself can often underpin a negative attitude towards indigenous knowledge (Grenier 1998). Correcting this through a mechanism that values children's prior knowledge and understanding, as in the biodiversity contest, would enrich formal environmental education.

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# REVITALIZING THE PHILOSOPHY OF THE GURUKUL SYSTEM FOR EFFECTIVE ENVIRONMENTAL EDUCATION

**Mrs. Arundhati Vishwasrao**
*Research Student, Department of Environmental Sciences, University of Pune, Maharashtra, India*
**Dr. Alaka Gadgil**
*Reader, Department of Geography, University of Pune, Maharashtra, India*

## Introduction

The drum beating the message of sustainable development and education for sustainable development (ESD) is heard far and wide and even India has joined the rhythm.

As advocated by the Honorable Supreme Court of India in the year 2003, environmental education is a compulsory school subject. With education being an old tradition and cultural heritage being rich and diverse, India is much closer to nature till date. Ironically India has the worse environmental problems that are intensely complex to deal with.

Though educational facilities have increased substantially during the last twenty-thirty years, children in democratic Indian are missing a lot by studying in a rigid school system, which is based on the British Education system.

ESD creates possibility of introducing informal education in a formal setup. Gurukul is a successful model of the same; besides, expectations from ESD are similar to those achieved in Gurukul.

## The Gurukul System

This system of education was well established during 1200-800B.C. The salient features were:

- The Guru's home was the school and his *shishyas* lived with his family during the entire period of education.
- Emancipation was the objective of education. The "shishyas" were given to understand that all are mere specks in the huge universe and performing ones own role dutifully is essential for smooth functioning of all systems in nature.
- The "Guru" was a wise man, a sage and an epitome of knowledge. He stepped into the role of a Guru voluntarily; only when he believed in his own capacity to teach and could not be challenged.

- Of the four Vedas, Rig Veda, Sam Veda and Yajur Veda were taught as texts to shishyas. Vedas are repositories of knowledge and contain "Para" and "Apara" Vidya. Vedas were handed down from one generation to another through oral tradition. This made the Guru's role very prominent. Without a Guru, education was impossible.
- The Guru assumed supreme control over shishyas during their stay at Gurukul. Children were accepted as shishyas after the Upanayan Sanskara.
- The shishyas were entirely devoted to education and helped in household chores including sweeping and cleaning the Guru's abode, plastering the floor with cow dung paste, taking animals out to graze, fetching water from a well, guarding a crop before harvest, etc.
- At Gurukul the shishyas developed:
  - Decision making ability - essentially leadership and ability to take necessary action - as in "action competence"
  - Ability to overcome materialistic wants
  - Excellent command over Sanskrit language
  - Values like respect for elders, honesty, obedience, humbleness, high regard for all living and physical entities, gratefulness towards nature, brotherhood, etc. were inculcated through education
  - Due to involvement of students in routine activities at the Aashram, a sense of responsibility was instilled and shishyas developed an ability to deal with infrastructural problems at Gurukul as well as in the society
  - Through plentiful opportunities of informal discussions with the Guru and fellow shishyas, teacher-student relationship blossomed and was par excellence
  - Students experienced a variety of emotions and learnt to control them effectively.

- Once the process education was completed to the Guru's satisfaction, the shishyas went back to their family and became independent sources of knowledge in the community - each earning the community's respect.

Modern systems of formal education in India stray from creating "wise citizens", resulting in loss of social integrity and self-respect. The benefits of increase in Indian economy and availability of material wealth has created social, political and economic inequality among the populace.

Education, even at school level, is largely disadvantaged, fueled by a stiff competition for bettering ones own social status. This pillar of education rests on a foundation that is weak in teacher education and

teacher-student relationship, which is further weakened by interference from political and religious organizations, especially in rural India.

Emancipation is not given the slightest thought at any stage in education. Inculcation of values, which is a prime need for effective environmental education, is sacrificed.

**Could the philosophy of the Gurukul be revitalized?**

Based on the basic values of respect for each other, excellence of excellence in another basic requirement for a democratic society, India has adopted democracy, as a way of life, so Gurukul in its philosophical dimension, is appropriate from these two essential dimensions of democracy

- Guru being a role model of excellence
- Student-teacher relationship based on respect for each other.

Whenever teachers and students meet in a modern setup of formal schooling, if the training system focuses on the value of respect and value of being excellent, Gurukul is not a deviant system, which cannot be fitted in at this juncture.

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## Annexure 1: Clarification of Terms

Guru - the term originated as an adjective and is used to address the highest or greatest teacher, the one who gave education for liberating the soul of materialistic bonding.

Gurukul - home of the Guru wherein the Ashram or the school was held. Such Gurukuls' were in the forests and also in towns. But the students lived with the Guru's family during the period of education, even if the Gurukul was in the same town. This system flourished later and was going strong till 7th century A.D.

Kul - this ideally means the family roots or family itself. The term is extended to include the Guru's abode.

Upanayan Sanskara - this was a religious ceremony the modern version of which is still performed in India as "Thread Ceremony". It does not convey the same meaning any longer. Upanayan was very important for a child, as it was a mental preparation to stay away from his family during the period of education. It also prepared the child for abstaining from worldly distractions. It was also a preparation for the family to send the child away. It also prepared the Guru to accept the child as his student for the next 10-12 years. The student's ability alone otherwise convinced the Guru to accept him or her as his disciple. Girls were also given admission to a Gurukul and also went through Upanayan. This ceremony was very significant as the Guru who adopted the child as his pupil, beheld the child, as a mother would hold her baby in her womb, for three nights. It was believed to be the rebirth of a child and even Gods came to seek the child's blessings.

Shishya - the student-disciples were known by this term. They served the Guru under whose tutelage they were engaged. Only then the

education received had any value. Education was not free, but a shishya could give whatever he could to the Guru in return for the education he received. It ranged from sacks of grain to gold coins. Many students who could not afford education served the Guru by doing manual labour at the Ashram or Gurukul. But the Guru was merciful and devoted to the well being of his students and therefore these hardships were well appreciated.

Veda - these were the sacred volumes that were taught during the Gurukul Period. They were handed down by oral tradition. Though pre-dated, they were written down after the Upanishads. Rig Veda being the foremost and the most important one was followed by Sam Veda, Yajur Veda and Atharva Veda. Atharva Veda was written much later than the first three. During the period of the Gurukul education included learning of the first three Veda.

Vidya - means knowledge, which is of two types Apara Vidya means knowledge of sciences, literature, etc. Para Vidya means knowledge of the eternal self that is close to nature and God. It was believed that it is this knowledge that makes one immortal.

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# THE ENVIRONMENTAL KNOWLEDGE, ATTITUDES AND BEHAVIOUR OF INDIGENOUS SCHOOLCHILDREN IN TAIWAN

**Homer C. Wu, Ph.D**
*Associate Professor, Graduate Institute of Environmental Education, National Taichung University, Taiwan, R.O.C.*
**Su-Lan Pan**
*Graduate Student, Graduate Institute of Environmental Education, National Taichung University, Taiwan, R.O.C.*
**Yao-Huei Huang**
*Teacher, Tzu-Yu Primary School, Taichung County, Taiwan, R.O.C.*

## Abstract

Numerous studies have been done to explore the relationships among environmental knowledge, attitudes and behaviours, yet no definitive answers have been found so far. After the International Year of the World's Indigenous People in 1993, the Taiwanese government has been paid more attention to the welfares and concerns of indigenous people. Here in Taiwan, indigenous people usually lived in the primitive environment, it is a must to conserve natural habitat in order to achieve the goal of sustainability, therefore, to understand their knowledge about, attitudes toward, and behaviour in the environment is becoming an important issue.

The authors developed a 54-item survey instrument to measure environmental knowledge, environmental attitudes and environmental behaviour among the indigenous school students in central Taiwan. The survey was completed by 388 grade third, fourth and fifth students from nine elementary schools in Nantou County and Taichung County.

The results showed low knowledge scores, appropriate behaviour scores, but high score levels for attitudes. The study revealed that there were statistically significant differences among indigenous students' county location and grade level in the environmental knowledge; as well as grade level and gender in the environmental attitudes. In addition, the differences among the indigenous students' socioeconomic status in the environmental behaviour were also statistically significant. This research found there were statistically correlations between indigenous students' environmental knowledge and attitudes ($\gamma$=.338), as well as between environmental attitudes and behaviour ($\gamma$=.129). But, there were no statistically significant correlation between environmental knowledge and behaviour. Consequently, schoolchildren with knowledge in mind would not necessarily produce positive behaviour; however, via "attitude", the

intervening variable, a pro-environmental behaviour might possibly happen even though it was only a low correlation. According to the findings, the authors suggest that in order to promote pro-environmental behaviour for Taiwanese indigenous schoolchildren; teachers should not only instill environmental knowledge but also foster positive attitudes in their daily life.

## Introduction

Taiwan has made rapidly economic progress in the past three decades. An increasing population with speedy economic growth has produced harsh environmental problems and a deteriorating quality of life (Environmental Protection Administration [EPA], 1988). In past decade, the public has become aware of environmental problems gradually and has initiated many efforts in environmental protection and conservation. One of these efforts was the promotion of environmental education (EPA, 1988, 1992). The Taiwanese government started to encourage researches about the environment, assess the content, framework and materials of environmental education (Yang, 1989). The Ministry of Education in Taiwan implemented environmental education as one of major issues of the nine-year integrated curriculum in 2001(Ministry of Education, 2000).

In 1977, the Tbilisi conference on environmental education outlined the objectives that environmental education should provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment (UNESCO, 1977). Fien (1993) suggested that environmental education should promote participation in a variety of forms of social action to help improve and maintain environment. Educating younger children is very important, given that most attitudes are immovable and difficult to change when students are in high school (Jaus, 1982).

After the International Year of the World's Indigenous People in 1993, the Taiwanese government has been paid more attention to the welfares and concerns of indigenous people. The Taiwanese government implemented the Project of Development and Improvement Indigenous Education which has further considered the need of indigenous people and trend of multi-culture education, and shifted the emphasis away from the role of the Hans people to the role of the indigene.

Numerous studies have been done to explore the relationships among environmental knowledge, attitudes and behaviour. In Taiwan, many researchers were eager to investigate environmental knowledge, attitudes and behaviour that they inquired students, teachers, national park officials, community leaders, and so on. However, there were only few studies regarding indigenous people.

The results of this study could provide government agencies, the school administration and the front line teacher as a reference to reform environmental education programs for indigenous people in Taiwan.

## Objectives

The objectives of the study were as follows:

- To assess environmental knowledge, attitudes and behaviour held by the indigenous schoolchildren in Taiwan.
- To identify any significant relationships between environmental knowledge and background variables.
- To identify any significant relationships between environmental attitudes and background variables.
- To identify any significant relationships between environmental behaviour and background variables.
- To identify any significant relationships among environmental knowledge, attitudes and behaviour.

## Method

### Research Design

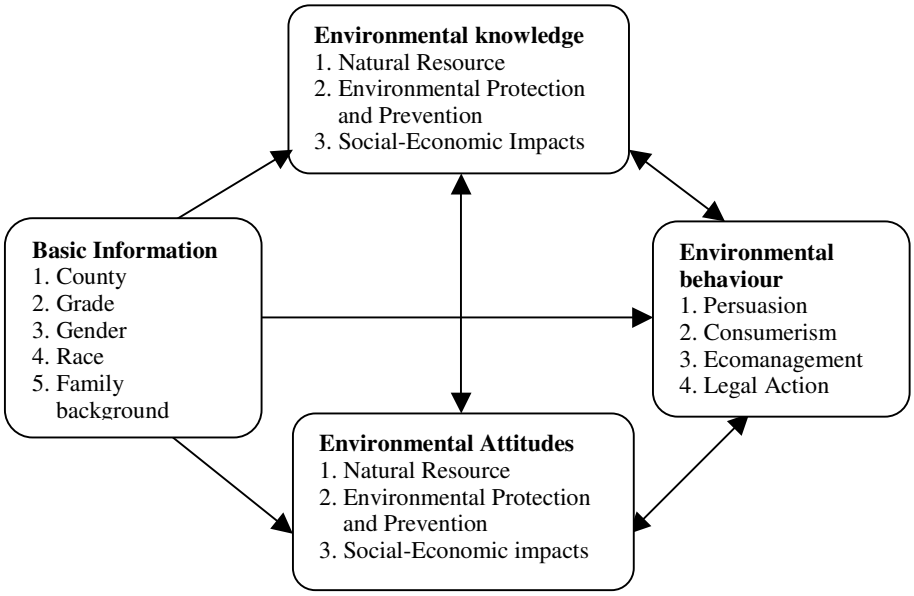


Fig. 1. Research Framework

## Population and sample

We surveyed the third, fourth and fifth grades of the indigenous elementary schoolchildren in Hoping town of Nantou County and Xinyi town of Taichung County in central Taiwan. There were eleven primary

schools with 305 third, fourth and fifth graders in Hoping of Nantou County, and seventeen primary schools with 602 schoolchildren in Xinyi of Taichung County. The total indigenous schoolchildren of these two counties were 907. We used stratified sampling and cluster sampling. The population was grouped two clusters by Nantou County and Taichung County. There were 133 students selected from four elementary schools in Nantou County, 324 students selected from five elementary schools in Taichung County.

A total of 457 students were sampled. Only 388 questionnaires were valid for data analyses.

## Hypotheses

The hypotheses were as follows:

Hypothesis 1: Environmental knowledge will differ from the background variables (county, grade, gender, race, family background) of the indigenous elementary schoolchildren.

Hypothesis 2: Environmental attitudes will differ from the background variables (county, grade, gender, race, family background) of the indigenous elementary schoolchildren.

Hypothesis 3: Environmental behaviour will differ from the background variables (county, grade, gender, race, family background) of the indigenous elementary schoolchildren.

Hypothesis 4: There are correlations among environmental knowledge, attitudes and behaviour of the indigenous elementary schoolchildren.

## Instruments

The instruments framework of environmental knowledge and environmental attitudes were adopted from Wang et al. (1987), which pointed out the constructs of environmental education in Taiwan should include three categories “Natural Resource”, “Environmental Protection and Prevention” and “Social-Economic Impacts”. These constructs were reflected the concepts of environmental education revealed by the Ministry of Education and the content of environmental education of the nine-year integrated curriculum. The instruments of environmental behaviour were based on the study of Hungerford and Peyton (1976) that included five constructs of responsible environmental behaviours (Persuasion, Consumerism, Ecomanagement, Legal Action, Political Action). The instruments were reviewed by a panel of 15 environmental education experts, and examined by two senior teachers of elementary schools in indigenous community.

The questionnaire was consisted of four parts: environmental knowledge instrument, environmental attitudes instrument, and environmental behaviour instrument and background variables.

Validity and Reliability

- Validity

The content validity of the questionnaire was formed by a panel of 15 environmental educators and experts, and the construct validity the instruments were reconfirmed by factor analysis.

- Reliability

Reliability is concerned with the consistency and stability of the instrument in measuring whatever it measures (Miller, 1992). The instrument reliability was established by coefficient alpha. The coefficient alpha was taken from the three constructs yielded value 0.8062 (environmental knowledge), 0.8499 (environmental attitudes), and 0.9086 (environmental behaviour). It proved that the instruments were reliable.

**Data analysis**

The statistical program used in this study was the Statistical Package for the Social Science (SPSS for windows 10.0). The statistical procedures conducted in this study were descriptive statistics, factor analysis, Independent-sample t-test, One-way ANOVA, and Pearson correlation.

**Results**

The Analysis of Environmental Knowledge, Attitudes and Behaviour:

1) The average score of indigenous schoolchildren in environmental knowledge was 56.6% with standard deviation of 1.52. The results showed low knowledge scores among indigenous schoolchildren regarding environmental knowledge.
2) The average score of indigenous schoolchildren in environmental attitudes was 80.95% with standard deviation of 2.66. The results showed positive attitudes toward the environment.
3) The average score of indigenous schoolchildren in environmental behaviour was 60.39% with standard deviation of 3.81. The environmental behaviours of indigenous schoolchildren in central Taiwan were moderate.

Hypothesis 1, 2 and 3 were investigated by t-test and one way ANOVA to understand the differences among the background variables, environmental knowledge, attitudes and behaviour, respectively. If the F value of variance analysis is above .05, we would use Scheffe's method for

multi-comparison in order to identify the differences among groups. Hypothesis 4 was investigated by Pearson product-moment correlation technique to determine relationships among environmental knowledge, attitudes and behaviour. An alpha level of .05 was used for statistical tests.

Hypothesis 1: Environmental knowledge will differ from the background (county, grade, gender, race, family background) of the indigenous elementary schoolchildren.

As shown in Table 1, As for environmental knowledge scores, we found significant differences with respect to county and grade (t=2.122, $p < .05$, county; F=14.197, p<.001; grade). After further analysis through Scheffe's method, the score of the fifth grade indigenous students was significantly higher than the third and fourth ones; the score of the indigenous students locating at Taichung County was significantly higher than that of locating at Nantou County. However, the scores of the environmental knowledge in gender, race and family background were not significantly different.

| | |
|---|---|
| **County** | |
| Taichung (N=109) | 11.20 |
| Natou (N=279) | 10.43 |
| t value | 2.122* |
| **Grade** | |
| third (N=132) | 10.35 |
| fourth(N=137) | 9.86 |
| Fifth (N=119) | 11.88 |
| F value | 14.197*** |
| Scheffe method | fifth＞third ; fifth＞fourth |
| **Gender** | |
| female (N=196) | 10.72 |
| male (N=192) | 10.57 |
| t value | .477 |
| **Race** | |
| Atayal (N=100) | 11.06 |
| Bunun (N=279) | 10.51 |
| t value | 1.470 |
| **Family Background** | |
| high class (N=17) | 11.24 |
| middle class (N=142) | 10.71 |
| lower class (N=224) | 10.57 |
| F value | .370 |

Note: * p<.05 ***p<.001

Table 1.The Difference between Schoolchildren's Background and Environmental Knowledge

Hypothesis 2: Environmental attitudes will differ from the background (county, grade, gender, race, family background) of the indigenous elementary schoolchildren.

As shown in Table 2, the environmental attitudes scores indicated significant differences with respect to grade and gender (F=10.729, p＜.001, grade; t=4.574, p<.001; gender). After further analysis through Scheffe's method, the fifth grade indigenous students scored significantly better than the third and fourth ones, then females have higher environmental attitudes scores than males. However, the scores of the environmental attitudes in county location, race and family background were not statistically significant different.

| | |
|---|---|
| **County** | |
| Taichung (N=109) | 48.50 |
| Natou (N=278) | 48.58 |
| t value | -.112 |
| **Grade** | |
| third (N=132) | 47.48 |
| fourth (N=136) | 47.76 |
| fifth (N=119) | 50.68 |
| F value | 10.729*** |
| Scheffe method | fifth＞third ; fifth＞fourth |
| **Gender** | |
| female (N=195) | 49.95 |
| male(N=192) | 47.15 |
| t value | 4.574*** |
| **Race** | |
| Atayal (N=100) | 48.54 |
| Bunun (N=278) | 48.71 |
| t value | -.229 |
| **Family Background** | |
| high class (N=17) | 47.59 |
| Middle class (N=142) | 48.84 |
| lower class (N=224) | 48.51 |
| F value | .356 |

Note: * p<.05 ***p<.001

Table 2. The Difference between Schoolchildren's Background and Environmental Attitudes

Hypothesis 3: Environmental behaviour will differ from the background (county, grade, gender, race, family background) of the indigenous elementary schoolchildren. From the data presented in Table 3, the environmental behaviour score indicated significant difference with respect to family background (F= 3.945, p＜.05). After further analysis

through Scheffe's method, the score of high family background was significantly higher than those of medium and low ones (F= 3.945, p＜.05). Even though, the scores of the environmental behaviour in county location, grade, gender and race were not statistically significant different.

| | |
|---|---|
| **County** | |
| Taichung (N=108) | 60.74 |
| Natou (N=275) | 60.32 |
| t value | .267 |
| **Grade** | |
| third (N=130) | 60.58 |
| fourth (N=134) | 59.95 |
| fifth (N=119) | 60.83 |
| F value | .136 |
| **Gender** | |
| female (N=195) | 61.30 |
| male (N=188) | 59.54 |
| t value | 1.237 |
| **Race** | |
| Atayal (N=99) | 60.72 |
| Bunun (N=275) | 60.27 |
| t value | .254 |
| **Family Background** | |
| high class (N=17) | 69.53 |
| middle class (N=140) | 59.63 |
| lower class (N=222) | 60.16 |
| F value | 3.945* |
| Scheffe method | high＞medium ; high＞low |

Note: * p<.05 ***p<.001

Table 3.The Difference between Schoolchildren's Background and Environmental Behaviour

Hypothesis 4: There are associations among environmental knowledge, attitudes and behaviour of the indigenous elementary schoolchildren.

Pearson product-moment correlations were employed to determine the relationships between environmental knowledge and attitudes, environmental knowledge and behaviour, and attitudes and behaviour. As seen in Table 4, first, the correlation coefficient of environmental knowledge and attitudes was positive and significant at the .001 level ($\gamma$=.338 p<.001). These data revealed that environmental knowledge and attitudes of indigenous elementary schoolchildren were significant positive

correlated. In addition, we also found the correlation coefficient of environmental attitudes and behaviour was statistically significant at the .05 level ($\gamma$=.129 p<.05). The finding suggests that environmental attitudes and behaviour of indigenous elementary schoolchildren are significant positive correlated. However, we found the correlation coefficient of environmental knowledge and behaviour was not statistically significant ($\gamma$=.088 p>.05). It was suggested that environmental knowledge would not necessarily produce responsible environmental behaviour.

| Score | Knowledge | Attitudes | Behaviour |
|---|---|---|---|
| Knowledge | | | |
| $\gamma$ | | .338*** | .088 |
| p vlaue | | .000 | .086 |
| Number | | 387 | 383 |
| | | | |
| Attitudes | | | |
| $\gamma$ | | | .129* |
| p value | | | .012 |
| Number | | | 382 |

Note: * p＜.05 *** p＜.001

Table 4. Bivariate Correlations (Pearson's $\gamma$) for the Relationship between Knowledge, Attitudes and Behaviour Scores

## Discussion

### Environmental Knowledge

In this study, we have shown that the score of environmental knowledge of the indigenous students locating at Taichung County was significantly higher than that of locating at Nantou County. The score of the fifth grade indigenous students was significantly higher than the third and fourth ones. Perhaps the fifth grade students' cognitive development and comprehension ability were better than the third and fourth ones; additionally, the fifth grade students have learned more relevant courses and activities about environmental education.

### Environmental Attitudes

The data on environmental attitudes indicated that the fifth grade indigenous students scored significantly better than the third and fourth ones. The reason probably was that the fifth grade students have learned more environmental education courses and have participated in more environmental conservation activities so that they realized the importance of

environmental protection. Moreover, the ethical development of schoolchildren was getting mature with the age so they showed more positive attitudes toward the environment.

In addition, females have higher environmental attitudes scores than males. After statistical analysis, the reasons were probably that the traditional (Chinese) education and social expectation result in the female schoolchildren perceived environmental protection as a personal responsibility. Hence, they have much higher positive environmental attitudes.

## Environmental Behaviour

The scores of environmental behaviour were statistically significant differences as to family background. The schoolchildren from high family background status had higher level of environmental behaviour than those medium and low ones did. This result was consistent with the findings of Paul & James (1977). Perhaps the reason was that students within low status family background have more concerned with making more money to improve their living standard instead of paying more attentions on the environmental issues. As a result, schoolchildren from high family background status would have more chances to fulfil positive environmental behaviour than those medium and low ones.

## Correlation among Knowledge, Attitudes, and Behaviour

This research found indigenous students' environmental knowledge and environmental attitudes were positively correlated. This finding was similar to those of Perez (1987), Arcury (1990), Armstrong and Impara (1991), Hsu and Roth (1996), Bradley, Waliczek and Zajicek (1999), Dimopoulos and Pantis (2003). Based on the results, the researchers suggest to develop a systematic knowledge of the environmental education for indigenous students in order to promote the positive environmental attitudes.

In addition, there was a positive correlation between environmental attitudes and behaviour. The finding was consistent with Kuhlemeier et al. (1999), Tikka et al. (2000), and Wu (2001). Hence, schools could pay more attention to the environmental curriculum about affection domain, enable children with proper environmental concepts and foster positive environmental attitudes so that responsible environmental behaviour can be achieved. However, the correlation between environmental knowledge and behaviour was not statistically significant.

This result was similar to Hungerford and Volk (1990), Huang (1998), Kuhlemeier et al. (1999), and Tikka et al. (2000). Therefore, students with abundant knowledge about environment would not necessarily generate responsible environmental behaviour.

## Conclusion

The results showed that indigenous schoolchildren had low knowledge scores but high levels attitudes, and moderate score of behaviour. There were significant differences in the average score of environmental knowledge between the grade and residence.

There were significant differences in the average score of environmental attitudes between grade and gender.

The environmental behaviour score was significant difference with respect to family background. This research found there were statistically correlations between indigenous students' environmental knowledge and environmental attitudes ($\gamma$=.338), and between environmental attitudes and environmental behaviour ($\gamma$=.129).

However, there was no significant correlation between environmental knowledge and environmental behaviour. However, via "attitude", the intervening variable, the responsible environmental behaviour might possibly happen even though it was only a low correlation.

## Recommendation

Based upon the conclusion, the study provided some recommendations as the reference for the government agency, school administration and front line teachers. The real challenge for Taiwan is to develop environmental education curricula, methodologies, and programs that are consistent with, and reflective of, indigenous own identity, uniqueness, and cultural background.

*For the government agency*

According to the study of Krugly-Smolska (1995), if the teaching method and assessment of teacher do not consider the students' multicultural background, it does influence the learning achievement of students. Therefore, the government should emphasis the historical culture, the values, and life background of every indigenous tribe through inviting experts in multiculturalism to join the task force while designing and compiling supplementary environmental education curricula, so that indigenous schoolchildren can learn materials regarding environmental knowledge from their own perspectives.

*For the school administration*

From the results, the family background status of the most indigenous families are classified as "middle class" and "lower class" in Taiwanese society, therefore, the school could provide "the parenting education lecture" and "parents-kids environmental conservation activity" to explicit the idea of environmental education to the parents and children, by presenting the related information about environmental protection in daily life, and by encouraging the parents to participate in the environmental

protection activity, so that their environmental knowledge and attitudes can be improved, and the responsible environmental behaviour will be produced.

*For the front line teacher*

Teachers should incorporate environmental education into each field of courses, and design meaningful learning classes and use appropriate teaching methods in order to enhance students' interest, so that they can obtain enough knowledge and possess positive attitude. In the meantime, the programming and pedagogies of environmental education should reflect the viewpoints of multiculturalism. Teachers can utilize and access websites or mass communication for teaching purposes, while indigenous students could use Internet to explore their horizon, hopefully their environmental knowledge can be strengthened. However, teachers should not only instil environmental knowledge but also foster positive attitudes in their daily life.

Hopefully, by doing this, more responsible environmental behaviour will be generated in the near future.

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## Correspondence

Address correspondence to Dr. Homer Wu at Graduate Institute of Environmental Education, National Taichung University, 140, Min-Sheng Road, Taichung City, 403 Taiwan, R.O.C. Phone: +886 4 22183141 FAX: +886 4 22183130 E-mail: homercwu@gmail.com

# Reports of research/Rapports de recherche
# Rapporti di ricerca

# I RABDOMANTI NELL'ARCO ALPINO OCCIDENTALE: INDAGINE SU UN SAPERE EMPIRICO

**Donatella Meaglia**

Il lavoro di ricerca sul campo qui di seguito esposto è nato con l'intento di registrare testimonianze di un sapere empirico ancora presente nelle vallate alpine italiane che ben si inserisce in un discorso globale di problematiche inerenti l'approvvigionamento delle risorse idriche.

Tale discorso è legato al crescente problema di carenza di acqua e mostra un aspetto del rapporto uomo-ambiente in un momento storico in cui l'utilizzo delle risorse naturali sembra diventato difficile da gestire.

Da ciò nasce la necessità di sensibilizzare al problema non solo la parte di popolazione attualmente adulta, ma anche le fasce di età più giovani, attuando programmazioni didattico-educative volte ad una formativa educazione ambientale.

Parallelamente si ravvisa la necessità di raccogliere le testimonianze di strategie di utilizzo delle risorse ambientali e di saperi del passato che possono apportare informazioni e modelli di comportamento ancora oggi validi per risolvere problemi di utilizzo sostenibile dell'ambiente.

Come già anticipato, dunque il lavoro di ricerca in oggetto è consistito nel raccogliere informazioni sull'attività dei cercatori d'acqua nell'area alpina occidentale italiana.

L'acqua è un composto chimico indispensabile per l'uomo, in quanto rappresenta il principale componente dell'organismo ed è inoltre sia cofattore primario nello svolgimento delle funzioni biologiche, sia oggetto di interesse culturale.

Per queste motivazioni la disponibilità di acqua ha da sempre rappresentato la *conditio sine qua non* per gli insediamenti e le attività umane. Non sempre, però, la disponibilità d'acqua era manifesta e allora l'uomo ha perfezionato e tramandato la pratica della rabdomanzia, finalizzandola alla ricerca di nuove fonti da mettere a disposizione della comunità.

Il metodo di ricerca delle falde acquifere utilizzato dai rabdomanti si è tramandato e mantenuto in uso, lungo il corso della storia umana, anche in ambienti già naturalmente ricchi di acqua di superficie come l'ambiente alpino, dove le conoscenze tradizionali sulle metodologie di ricerca delle fonti sono arrivate fino ai giorni nostri, permettendo di confrontare usi e modalità d'azione in aree diverse.

Le indagini sono state svolte in quattro valli della catena alpina occidentale italiana: Val Chisone (di cultura occitana), Val di Susa, Val Cenischia e Val d'Aosta (di cultura franco-provenzale), registrando notizie di 16 rabdomanti, di cui 5 contattati personalmente.

Da tali indagini è emerso che la metodologia con cui si effettuava (e si effettua ancora oggi) la ricerca, consisteva in due fasi successive: la prima era la

ricerca del preciso punto del terreno sotto cui scorreva l'acqua, la seconda era quella che permetteva di valutare con una buona approssimazione (+ o – 50 cm) la profondità alla quale scorreva.

Per definire il punto del terreno in cui scavare il pozzo, il rabdomante si serviva di bastoncini di legno fresco a forma di Y, di V o lineari.

Per effettuare la ricerca il rabdomante procedeva lentamente sul terreno, impugnando lo strumento con entrambe le mani; arrivato nel punto giusto avvertiva lungo le braccia una forza sotto l'azione della quale la punta dello strumento si piegava verso il basso o verso l'alto, indicando il punto in cui scavare. Per effettuare la seconda fase della ricerca, cioè valutare la profondità della falda, il rabdomante si serviva di un apposito pendolino metallico oscillante che teneva sospeso sul punto del terreno segnalato dal bastoncino; si concentrava su precisi valori numerici crescenti di profondità in metri e quando arrivava a pensare l'esatta profondità, il pendolino si immobilizzava.

La capacità di una persona di trovare l'acqua viene chiamata "il dono" ed è definita "innata". In effetti, anche nell'ambito della stessa famiglia non tutti i componenti evidenziano questa capacità, permettendo di ipotizzare che la capacità non sia solo frutto di un apprendimento per imitazione, ma l'evidenziazione di una capacità non comune a tutti. Il dono si può evidenziare sia in età infantile che adulta, provando sotto la guida di qualcuno che lo possiede e lo utilizza. Non tutti quelli che hanno il dono lo utilizzano, non tutti inoltre hanno l'opportunità di verificare il possesso o meno di questa capacità.

Per i motivi appena esposti risulta difficile fare un censimento di quante siano le persone delle comunità studiate che attualmente hanno il dono, senz'altro la valutazione risulterebbe approssimata per difetto. Non esistono neanche dati storici ufficiali, probabilmente perché l'attività di cercatore d'acqua non era una professione vera e propria, ma un sapere, una capacità messa a disposizione della comunità. Per questo motivo la ricompensa era quasi sempre rappresentata da omaggi in natura, a meno che l'attività si svolgesse al di fuori della propria comunità.

In tre delle quattro valli dove è stata condotta l'indagine cioè Val d'Aosta, Val di Susa e Val Chisone, nonostante le differenze di origini culturali e linguistiche, risulta esserci uniformità nelle ricche conoscenze per quel che riguarda le metodologie di ricerca dell'acqua. Tali conoscenze sono in accordo con quelle riportate dalla bibliografia, anche storica, e rispecchiano le metodologie da sempre utilizzate dai cercatori d'acqua nei più diversi ambienti ed epoche.

Ciò porta a ipotizzare che si tratti di conoscenze molto antiche, già presenti e diffuse nella zona in epoca antecedente a quella in cui si sono differenziate le aree linguistiche di cultura occitana e franco-provenzale.

Si discosta dalle precedenti la situazione rilevata in Val Cenischia, dove, al momento attuale delle ricerche, non sono emerse testimonianze di nessun tipo di attività rabdomantica, passata o presente, finalizzata alla ricerca di nuove fonti. Tale dato può essere spiegabile con l'enorme

abbondanza in questa valle di acqua di superficie, anche a quote elevate, per cui neanche in passato gli abitanti hanno avuto necessità di sviluppare o utilizzare strategie finalizzate alla ricerca del prezioso liquido.

Dalle indagini svolte emerge come l'acqua, bene primario di vitale importanza per la sopravvivenza, fosse talmente indispensabile da desiderare di mantenerne il diretto e completo controllo e quindi si evidenzia come fosse forte l'esigenza di cercare punti di approvvigionamento vicino alla propria abitazione o ai propri terreni, con uno sfruttamento delle risorse ambientali di tipo individualizzato.

È solo tra l'inizio e la metà del secolo scorso che, anche nelle comunità alpine studiate, nasce l'esigenza di costruire acquedotti comuni, a gestione centralizzata, coinvolgendo però, anche in questo caso, i cercatori d'acqua per individuare con sicurezza la localizzazione delle sorgenti sotterranee da sfruttare.

Nell'ambito di un discorso interdisciplinare sul rapporto uomo-acqua in ambiente alpino è sembrato utile raccogliere e registrare fedelmente testimonianze di un antico sapere a connotazione empirica nel quale la figura protagonista del cercatore d'acqua

> c'est une personne intermédiaire entre les mondes visible et invisible. Il recoit des informations du monde invisible à destination du monde humain (A. Jaeger-Nosal).

In sostanza, si può affermare che la rabdomanzia risulta essere un'attività ancora utilizzata e di cui si conserva memoria perché ritenuta efficace, pur mantenendo una connotazione empirica, priva di giustificazioni scientifiche, oggi come nel XV sec., ai tempi di Leonardo da Vinci, che asseriva:

> Se t'avvien di trattar delle acque consulta prima l'esperienza e poi la ragione.

# TRADITIONAL KNOWLEDGE AND ENVIRONMENTAL EDUCATION AND PRACTICE IN SRI LANKA

**Rohan H. Wickramasinghe**
*Institute for Tropical Environmental Studies,*
*41 Flower Road, Colombo 7, Sri Lanka*
*ites@itmin.net*

## Introduction

Descriptions of the characteristics of Sri Lanka are given elsewhere (Wickramasinghe, 1986, 1997). While a census performed in 1824 recorded a figure for the island of some 890,000, a considerable population was probably present in the island in the early historical period (Arunachalam, 1902; Brohier, 1934, 1935; Forbes, 1840; Ranasinha, 1950 and Tennent, 1859). The increasing population (Department of Census and Statistics, 1991; Wickramasinghe & Gunaratna, 1993) is presently estimated as being around 20 million.

## The Peoples of Sri Lanka

Archaeological evidence suggests the habitation of Sri Lanka by humans since at least 75 to 125,000 B.C. (S. Bandaranayake, personal communication). Bandaranayake (1985) comments on the heterogeneity of Sri Lankans in the prehistoric past and the importance of the migration of techniques. Historical records exist of the travels of individuals between Sri Lanka and Europe and the Middle East on one hand and China on the other (Gunaratna, 1987; Tennent, 1859). Pliny recorded that the King of Anuradhapura sent an embassy of four, headed by one Rachias, to Roman Emperor Claudius Caesar around 47 A.D. Marco Polo lived in Sri Lanka from 1292 to 1294.

Sri Lanka formed part of the empires of the Portuguese (1505-1656), Dutch (1656-1796) and British (1796-1948). Among other "technologies", domestic cuisine in Sri Lanka has absorbed influences from the Sinhalese, Tamils, Arabs, Malays, Moors, Portuguese, Dutch, British and French (Deutrom, 2005). Other introductions include the faiths and followers of Buddhism, Hinduism, Christianity, Islam and Zoroasterism (the Parsees). The Veddahs or indigenous hunter-gatherers were believers in Animism.

Before considering traditional knowledge in Sri Lanka, it must be repeated that the population of the country is composed of groups which can be distinguished on the basis of, for instance,

- ethnic origin
- religion

- caste (Banks, 1960; Ryan, 1953; Wickramasinghe, 1986)
- traditional or family occupations (Wickramasinghe, 1986)
- educational, social and (or) economic position.

The ethnic groups in the country include the "Low Country Sinhalese", "Kandyan Sinhalese", Ceylon Tamils, Indian Tamils, Ceylon Moors, Burghers and Eurasians and Malays (Department of Census and Statistics, 1991; Wickramasinghe and Gunaratna, 1993).

## Traditional knowledge

There was no single source of traditional knowledge in Sri Lanka. The individual components of the store of traditional knowledge in the country have been contributed by various sources and tempered by experience to meet local conditions.

An example may be found in the field of ayurvedic medicine, which has flourished in India for more than 3000 years. We have proposed that the efficacy of certain of these preparations in Sri Lanka may be linked to the consumption of curries heavily spiced with chilli peppers (Wickramasinghe, Mueller & Norpoth, 1980).

## Traditional knowledge sources

Reviews by Dr. C.G. Uragoda (1987, 1989-90, 2000) give overall information on the traditional knowledge of the country. Specific sources are given below:

- Medical knowledge (Uragoda, 1987).
- Antisepsis (see Aluthwela *et al.*, 1987; Chopra *et al.*, 1958).
- Medicine troughs(Gunawardena, 1978).
- Malaria transmission by mosquitos (Blake, 1905; Nell, 1925; Stephenson, 1972; Still, 1930; Tennent; 1960).
- Insect pests (Anon, 1903; Lewis, 1934; Perera, 1984; Senaratna, 1952; Trimen, 1895 vol. 3; Uragoda, 2000; Worthington, 1959).
- Weed control (Paul, 1945).
- Chena cultivation (Boomgart, 1720; Wickramasinghe, 1997).
- Iron and steel production (Juleff, 1990, 1996; Uragoda, 2000).
- Harvesting of pearls (Pearson *et al.,* 1926; Uragoda, 2000).

## The Future

Space does not permit discussion of the prospects and proposals for the development of environmental education and of traditional practices. However, further information may be found in the following publications: Anon (1998); Shantha (1996); Wickramasinghe (1989); Wickramasinghe, Fonseka and Fernando (1991); Wickramasinghe (1993); Wickramasinghe (1994 a, b); Wickramasinghe (2005 a, b).

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