



Terralingua  
UNITY IN BIOCULTURAL DIVERSITY

# VITEK

## VITALITY INDEX OF TRADITIONAL ENVIRONMENTAL KNOWLEDGE

AN INTRODUCTORY GUIDE





# Introduction

Terralingua created this manual as a handy compendium of introductory materials on our Vitality Index of Traditional Environmental Knowledge (VITEK).

The VITEK is a new and unique tool, developed and extensively field-tested by ethnobiologist Dr. Stanford Zent (Instituto Venezolano de Investigaciones Científicas). It serves to measure the intergenerational retention or change of traditional environmental knowledge (TEK). To our knowledge, there currently is no other quantitative methodology that allows for the direct assessment of the state and trends of TEK in indigenous and local communities.

Furthermore, the VITEK is conceived to be not only locally appropriate, but also globally applicable. Its methodology is flexible enough to be adapted to specific local contexts, yet rigorous enough to allow for replicability and comparability across different contexts.

At the local level, the VITEK can allow indigenous and local communities to conduct self-assessments of the vitality of their TEK, and can thus point to the need for action to bolster and revitalize TEK wherever it may be on decline.

At the same time, the VITEK methodology also allows for compiling data from an entire region or country, and thus can serve to produce TEK trends at national and even global scales and to guide policy action at national and international levels.

The VITEK has attracted the attention of Indigenous Peoples' organizations as well as of international organizations, because of its relevance to the protection and preservation of indigenous and local knowledge related to the conservation of biodiversity.

We are proud to make this manual available to participants in the 5th World Conservation Congress (Jeju, Korea, 6-15 September 2012), and in particular to participants in our VITEK Conservation Campus (Session #0635, 10 September 2012, (9:00-18:00, Crystal Ballroom 3, Lotte Hotel). Based on this training experience, we plan to develop an e-learning module on the VITEK for wider dissemination, to be accompanied by an expanded version of the manual.

We hope you will find these materials useful and informative, and that you will consider applying the VITEK methodology in your community, region or country!

Luisa Maffi, Ph.D.

Terralingua Co-founder and Director



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# What is Traditional Environmental Knowledge (TEK)?

Luisa Maffi

**T**raditional environmental knowledge, or traditional ecological knowledge (TEK), has been described in many different ways, but perhaps the definition provided by Canadian biologist Fikret Berkes (University of Manitoba) sums up the main characteristics of TEK that most people would agree with:

*“Traditional Ecological Knowledge is a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment.”*

This definition highlights the following points:

- TEK is a “knowledge-practice-belief complex” (Berkes), that is, it is knowledge rooted in a specific cultural worldview and closely linked to know-how (practice).
- TEK is cumulative, that is, it is a body of knowledge that grows over time through the accumulation of observation of and interaction with the natural world.
- TEK is not static, but changes and evolves over time as a result of the process of mutual adaptation between people and the environment.
- TEK is a cultural construct, and as such it is passed on from one generation to the next through cultural transmission—the process of teaching and learning that successive

generations engage in with one another.

- TEK is not only knowledge about plant and animal species, their habitats, and ecological processes; it is also wisdom about how people should live with one another and with—as well as within—the natural world. In other words, it is a holistic perspective that blends empirical experience with the natural world (what one might call “science”) with moral teachings about how to live with one another and with the natural world (what one might call “ethics”).

In other words, TEK is not just about what to know about a place you live in; it is also about how to live in a place you know. In this way, the notions of respect, caring, and stewardship are all intrinsically and intimately bound to the environmental knowledge that lies at the core of TEK. Therefore, TEK not only provides a cognitive road map to navigate the natural world; it also offers a moral compass for finding the right way to navigate it.

By implication, this also shows that TEK is not disembodied and disconnected knowledge. On the contrary, it is knowledge deeply connected with both its natural and cultural context, and immersed in a web of both ecological and social relations. As such, it plays a central role in sustaining the organization, vitality, and resilience of both human societies and ecosystems.

The value of TEK for both its holders in indigenous and local communities, and for humanity at large, has

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‘What is “traditional” about traditional knowledge is not its antiquity, but the way it is acquired and used. In other words, the social process of learning and sharing knowledge, which is unique to each indigenous culture, lies at the very heart of its “traditionality”’

(The Four Directions Council, 1996)

long been recognized by researchers and others who have had an opportunity to become familiar with the breath and depth of traditional knowledge systems. Over the past two decades, following the 1992 Rio Summit, the importance of TEK has also made its way into international policy instruments, particularly the Convention on Biological Diversity (CBD), Article 8j of the CBD stresses the relevance of TEK for biodiversity conservation, and calls to the Parties to the Convention to:

*“Subject to its national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices.”*

Along the same lines, Target 18 of the CBD Strategic Plan for Biodiversity 2011-2020 requires that, by 2020, *“the traditional knowledge, innovations and practices of indigenous and local communities [...] are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention”*.

To achieve this goal, it is crucial to have reliable means to gauge what is happening with TEK around the world. There is mounting evidence that TEK is being eroded worldwide. A key element in this process is that inter-generational transmission and use of TEK are being diminished, because of rapid economic, social and cultural changes that are negatively affecting indigenous and local communities.

It is essential to understand and measure the

loss and retention of TEK and its transmission, and to identify the drivers of change, in order to support community efforts to maintain and use TEK, for their own benefit and for the broader benefit of humanity. Therefore, there is a vital need for appropriate indicators to measure whether TEK is being retained, eroded or augmented, and to identify the factors that may influence these trends. The Vitality Index of Traditional Environmental Knowledge (VITEK) was developed to address this need.





# What is the VITEK?

Stanford Zent

## What does VITEK stand for?

VITEK refers to Vitality Index of Traditional Environmental Knowledge (TEK).

## What exactly is VITEK?

The VITEK is an experimental indicator or method for measuring the vitality of TEK across generations within a given community or population. Vitality is defined here as the rate of retention of knowledge over a specified time period. The inverse of the retention value is effectively the amount and speed of change. Thus the VITEK can tell you how much of the knowledge base is or is not being transmitted from one generation to the next.

## What are the measurement properties of this indicator?

It is quantitative, replicable, comparative, aggregative, modular, and directly measures the dynamic states and trends of TEK itself (rather than measuring proxy variables).

## What are the main design features of VITEK protocol?

It is (potentially) universally applicable, meaning it can be applied to any cultural group or place, yet it is also locally appropriate, meaning it can be adapted to fit different local circumstances. Furthermore, it depends on representative sampling of both the population of people as well as the knowledge base that the assessment is based on.

## What kinds of cultural-ecological groups can the VITEK be applied to?

Any kind: indigenous and non-indigenous, native and migrant, urban and rural, coastal and mountain, pastoral and agricultural, insular and continental, subsistence and commercial, etc.

## What types of traditional knowledge and practices are taken into account by the VITEK?

The kinds or domains of TEK that are included in the measurement are decided by the local people themselves. However, in order to permit direct comparisons among different groups, we start with a predetermined list of cosmopolitan TEK domains that are widespread (but not necessarily universal) among diverse cultural groups and places throughout the world. The cosmopolitan domain list is divided into two main components: 1) conceptual knowledge and 2) practical skills (or occupations). The first includes the domains of: plants, animals, floral-faunal interactions, soils, biotopes (or eco-communities), places (that is, points or spaces in the local landscape), and climate. The second one is comprised of: primary resource production or procurement (which itself can be divided into distinct occupations, such as agriculture, pastoralism, hunting, collecting and fishing), food processing and preparation, ethnomedicine, crafts and tool-making, and architecture and building. It is important to emphasize, however, that this list is merely a preliminary guide or starting point and needs to be modified and adapted according to local criteria and significance. Thus some of the cosmopolitan domains may be eliminated while others are added.

### **How can the vitality (or rate of retention over time) of all these things be assessed?**

The VITEK assessment essentially involves measuring the differences of knowledge and practices between people of different generations. The assessment process entails two basic steps: 1) compile a register or inventory of data items (for example, plants known and used, biotopes named or recognized, farming techniques, craft types and styles, etc.) for each local domain, based on the judgment of locally recognized experts; and 2) construct a TEK aptitude test, based on the register of data items, and administer the test to a sample of individuals in at least three generations (grandfather/mother, son/daughter, and grandson/daughter). The results of the test can be used to calculate the vitality measure, which consists of three integrated statistics: a) intergenerational rate of retention, b) cumulative rate of retention, and c) annual rate of change.

### **Is the VITEK sensitive to gender differences?**

Yes, the method maintains a strict separation of the sexes in both phases of the assessment process, data register compilation and aptitude testing. However, if the community decides that such division is inappropriate, then it can be ignored. Also, the statistical results of the test can be combined if so desired.

### **Who should find the VITEK to be a useful tool?**

First and foremost, it is intended for use by local communities and organizations, for example to assess the healthy/unhealthy state of their cultural heritage and decide if any pro-active measure need to be taken. Second, it can enable aid providers to identify critical situations and target interventions where they are most needed. For policymakers, it can provide a tool for monitoring trends in traditional knowledge retention or erosion over time, and also serve as a yardstick for evaluating policy performance. For researchers, it is a convenient statistic that can be used to test hypothesis about the causal or interactive relationships among TEK, biodiversity and local language preservation.

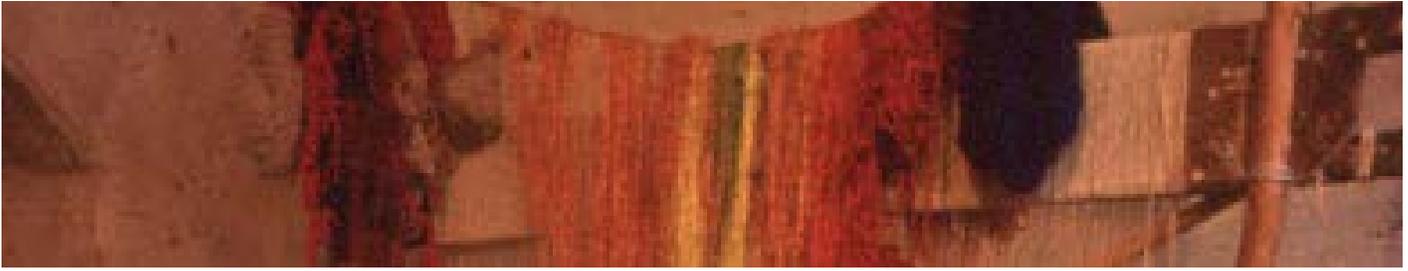
### **Is VITEK currently being used?**

A pilot study of the VITEK assessment method is currently underway in Venezuela, where it is being applied in three different sites by a team from the Instituto Venezolano de Investigaciones Científicas. The purpose of the pilot study is to evaluate the feasibility, practicality and efficiency of the method and come up with any needed changes.

### **Do you want to know more about the VITEK?**

Check out the following web page: [www.terralingua.org/vitek](http://www.terralingua.org/vitek) or write to Stanford Zent at [srzent@gmail.com](mailto:srzent@gmail.com).





# The VITEK in Detail

Stanford Zent

## 1. Quantifying States and Trends of Traditional Environmental Knowledge (TEK)

The development of a quantitative approach in research on traditional environmental knowledge (TEK) over the past couple of decades has raised the scientific status of this field of inquiry and expanded our understanding of the specific relationships and importance of the local environment for different cultural groups. Quantitative methods have been applied mainly to study the perception and use of different plants and animals, ethnomedical practices, agroecological management techniques, beliefs about animal-plant interactions, the economic importance of certain resources and habitat types, and the ecological impact of land use and resource exploitation patterns.

Some of the key statistical measures include: a) the proportion of local biodiversity that people name and use, b) the cultural importance values and use preferences of different biological taxa (e.g. species, families, biotopes), c) the monetary valuation of wild resources and habitats for local communities, d) the actual use frequencies or harvest intensities of certain resources, and e) the perceptual, morphological, biological, and ecological characteristics of useful plants. Special attention has also been given to capturing and measuring the variation of knowledge and behavior across individuals and sociodemographic groups.

Such information has yielded insights in regards to the social distribution and exchange of knowledge within populations. At the same time, the testing of hypotheses about the relationships between social

or ecological variables and patterns of knowledge variation through statistical analysis enables us to identify what causal or conditioning factors are operating in particular places.

The steady accumulation of quantitative research has advanced our comprehension of the current states and trends of TEK systems around the world by creating a wealth of empirical data on aspects of knowledge sharing, variation, transmission, acquisition, change, continuity and hybridization in dozens of diverse cultural and biogeographic settings. The different case studies are distinguished by innovative research methods and the applied significance of the findings for conservation and development issues.

For example, some researchers have devised measures of the persistence/loss of TEK and significance tests of the factors contributing to this process. Such measures facilitate the identification of endangered versus robust situations and therefore may point the way for necessary intervention programs. Anticipating the continued growth of this line of research, it is important to consider the potential contribution of this work, as a source of data and methods, for the elaboration of more refined indicators of the conditions and trends of cultural diversity, in support of a better understanding of the state of biocultural diversity and of the development of appropriate policies.

An extensive reading of the relevant literature reveals a wide variety of methods being used and a complex panorama of distinct results across different sites, making it somewhat difficult to spot generalized

patterns at the present time. For example, even though the erosion of TEK in response to cultural or economic globalization forces and their collateral effects stands out as one of the principal recurrent and widespread trends reported in many studies, this devolutionary trend is by no means universal nor uniform. Thus while some authors have observed the negative impact of formal education, language shift, market integration, imported medicines, sedentism, migration, habitat change, public economic assistance, television and other modernizing influences on traditional knowledge retention, others have found remarkable persistence in the face of surrounding social, economic and environmental change. In still other studies, the acquisition or creation of new forms of TEK by local groups has been highlighted. Even where the available data support the conclusion that knowledge is declining, the particulars of this process – i.e. rate of decline, types of knowledge being lost, persons affected, and conditioning factors - vary considerably across groups and sites.

It might seem reasonable to suppose that the divergent results are explained by the culture- and site-specific nature of this process. However, here we suggest that another important reason for the observed inconsistency is that different research designs and methods have been used. The ways that knowledge is defined and measured, the sample design, the variables included in the analysis, and the statistical procedures chosen exert an important influence on the research results and conclusions. Most individual studies of TEK variation and change are limited to single communities or ethnic groups, or occasionally encompass several communities within the same local area. Furthermore, these studies have been focused on particular, often narrowly defined, knowledge domains to the exclusion of others. For instance, the vast majority of studies have dealt exclusively with ethnobotanical knowledge whereas very few have explored ethnozoological knowledge. It is rare to find research reports in which the same exact method, scope and sampling strategy has been applied in multiple settings, and in the few cases where comparative analysis has been carried out it is usually done in a post hoc fashion.

Clearly, the lack of methodological uniformity inhibits comparability and constitutes the main impediment for a more global and theoretical understanding of the complex and varied empirical reality. It is precisely because of this lack of systematic comparability across cases that doubts are raised about whether preexisting data sources can really serve reliably as the basis for developing a global indicator of TEK status and trends. The standard of comparability required by such an indicator is numerical comparison according to a common method and metric as well as the ability to aggregate measures across different spatial scales, a standard which cannot be met by the data that is currently available. Given this limitation, some authors (Zent 2008) have argued that the only feasible path for developing a true global indicator of TEK is by: 1) designing a standardized data instrument and 2) collecting primary data through the application of the instrument in different localities.





Copyright P. Latham



*TEK Aptitude Test Example:*

*¿A cuál árbol se refieren las siguientes imágenes?*

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## 2. A Globally Applicable, Locally Appropriate Proposal: The VITEK Indicator

In the last few years, stimulated mainly by the CBD's mandate to develop a series of global indicators for assessing progress towards the reduction of biodiversity loss, a number of proposals have been put forth which seek to identify and define cultural indicators of traditional knowledge, practices and innovations that may be relevant for biodiversity conservation. However, some of these proposals amount to mere checklists of cultural practices and institutions, or the public policies that have been adopted with respect to indigenous and local communities, that are considered to be somehow representative of traditional knowledge but are not direct manifestations of it (e.g. presence/absence of native healers, state recognition of land rights, local participation in protected area management) (IUCN-CBD-FIIB 2007). Furthermore, there are often no clear guidelines regarding how such indicators should be recorded or quantified, much less combined to form aggregate measures. An alternative proposal is the VITEK (Vitality Index of Traditional Ecological Knowledge) assessment. The VITEK differs from the other traditional knowledge indicators in that it combines the qualities of being quantitative, comparative, aggregative, and directly representative of TEK itself (instead of relying on measures of proxy variables). Moreover, a precise methodological protocol for implementing and calculating the VITEK has been developed (Zent 2008) and systematically tested in several locales in Venezuela, other countries in Latin America, Italy, and elsewhere.

The VITEK protocol consists of an integrated set of methods that is intended to provide quantitative measures of the vitality status of traditional environmental knowledge (TEK) among different cultural groups. The methodology is standardized in terms of its basic structural design, yet flexible in terms of the specific contents and procedures used in its application. The concept of "vitality" is operationalized here as the rate of retention of knowledge from one generation to the next.

The protocol is specially designed to satisfy three primary criteria: (1) global applicability, (2) local appropriateness, and (3) representative

sampling. Global applicability refers to the ability to apply the assessment method to any local or cultural group in any part of the world, whether indigenous/nonindigenous, native/immigrant, rural/urban, agricultural/nonagricultural, mountainous/coastal, tropical/temperate, etc. This criteria is fulfilled by a standardized general procedure for data collection, analysis, and measurement that permits the systematic comparison of the rates of TEK change among different groups as well as the aggregation (and comparison) of such rates at different levels of inclusiveness: local community, ethnic group, ecoregion, province, country, etc. Local appropriateness refers to the specific adaptation of the general procedure to fit the categories, values, activities, social contexts and biotic environments that are meaningful and pertinent according to the local groups themselves. This criteria is met by allowing members of the target community to decide and judge what domains and constituent items of their knowledge system should potentially be included in the assessment and what relative importance value should be assigned to each one of these. Another aspect of appropriateness is the building of local capacity to carry out the assessment on an independent basis through the training and participation of community residents in the implementation of the assessment process as well as the management of the results. Representative sampling is understood as encompassing both the population of people as well as the range and composition of TEK domains that the assessment is based on.

For the purposes of the VITEK, we believe that the best approach for achieving widespread acceptance and sustained implementation is by engaging and empowering local community members to eventually carry out the data collection and analytical process on their own—which is to say a participatory, collaborative approach. Optimally, the VITEK would be recalculated at regular time intervals (e.g., every 5 or 10 years) to produce true time series measurements. The ideal scenario for making this happen would be by giving the participating communities the training and capacity to manage the assessment on a self-sustaining basis (and use the results for their own purposes in addition to the global assessment).

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Unfortunately, many of the methods and calculations that have been used to measure TEK are too complicated and/or laborious to expect that local people would be willing or capable of doing this over the long term without specialized and perhaps recurrent instruction. For these reasons, the best methods from the standpoint of the VITEK are the simplest ones.

### 3. The VITEK Protocol

After obtaining prior informed consent from groups participating in data gathering, the VITEK protocol proceeds according to the following steps:

1. The first step toward assessing TEK vitality is to construct a data register or inventory of conceptual categories and items that represent a significant portion of the local body of knowledge. The register comprises the baseline data for the VITEK. The basic method for constructing the data register relies primarily on rapid participatory appraisal techniques, especially consensual consultation with local group members in the context of collective gatherings. Although this technique may not be as systematic or accurate as structured interviews or questionnaires, it is relatively fast and efficient, allows for greater participation of community members, and prioritizes local criteria by letting the consultants themselves decide directly what categories and items are correct, representative, and relevant.

2. Even though TEK is frequently portrayed as holistic and totally integrated with virtually all aspects of local culture and lifestyle, empirical investigations of numerous cultural systems of knowledge have convincingly demonstrated that TEK is structured at cognitive and behavioral levels into distinct domains. The VITEK requires that relevant domains of TEK be defined at two basic scales: cosmopolitan and local. The cosmopolitan scale refers to domains (and subdomains) that are loosely recognizable in many different cultural and ecological contexts around the world, while local domains are culturally specific domains and categories defined and recognized by the local group.

The protocol specifies a predefined set of cosmopolitan domains that are intended to cover

a significant portion of TEK, including conceptual knowledge of biodiversity in its different forms (e.g. plants, animals, plant-animal relationships, biological communities, soils, climate, ethnogeography) as well as practical skills associated with the use and management of natural resources (e.g. resource procurement or production, craft and toolmaking, food preparation, curing, architecture and construction) (see Appendix 1, Cosmopolitan Domain List). A subset of these are delimited, adapted and translated into local domains through the consultative process mentioned above.

3. After the local domains are established, the next step is to make a selected inventory of the categories or items (50–100 total for practicality's sake) pertaining to each one. Using culturally appropriate scoring methods, both the list of local domains and the constituent items comprising each one are then weighted based on local participants' assessment of their cultural importance.

4. A standardized test designed to rate the TEK aptitude of individuals in the participating local group is prepared. The aptitude test consists of questions drawn from the inventories of domains and items elicited in the preceding stages. It is divided into two equally weighted sections: (a) a conceptual knowledge component and (b) a practical skills component. The makeup and scoring of each component is determined by the proportional weight assigned to the different domains and their inclusive items. The TEK aptitude scores obtained in the test are used directly for making the vitality assessment.

5. A representative sample of subjects is selected to take the test. The assessment design requires the testing of a population sample that minimally includes persons of different age and gender groups. Age is the main social variable used to infer the rate of retention/change, which is measured as a function of intergenerational differences in test scores and the size (in years) of the generation span. Gender is another critical variable due to the fact that the sexual division of labor, experience and knowledge is so commonplace, though not necessarily universal, and therefore interindividual comparisons of test scores must be divided along this line, at least during a preliminary phase of measurement. Other

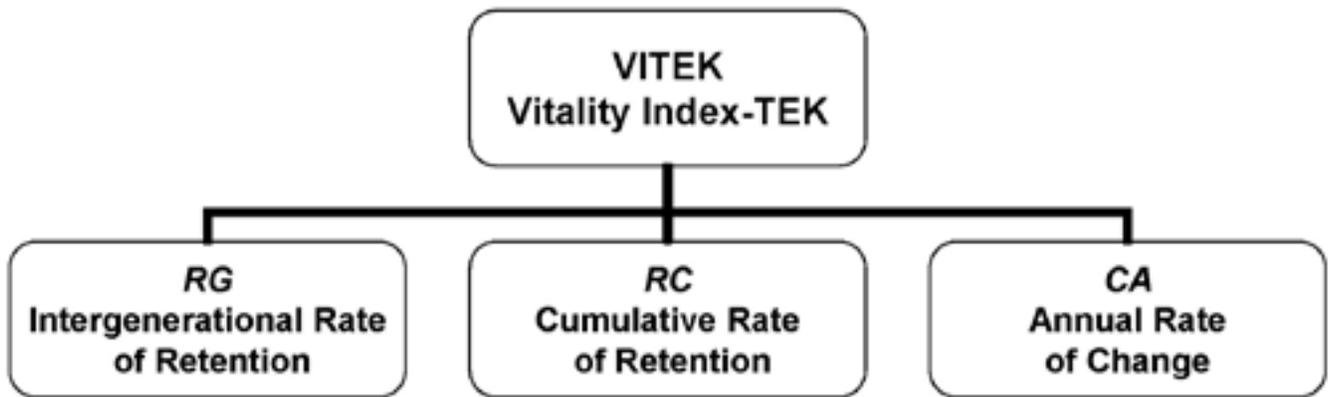


Figure 1. VITEK Component Measures

disaggregations of the results can optionally be made such as language(s) spoken, education, occupation, socioeconomic class, and community, in which case these strata would also have to be included in the sample.

6. Finally, the VITEK itself is calculated. It consists of three related measures: the intergenerational rate of retention (RG), the cumulative rate of retention (RC), and the annual rate of change (CA) (see Figure 1 and Appendix 2, Calculating the VITEK Statistics). All of these rely on very simple statistical calculations and can be done by hand or with a pocket calculator. The first step is to calculate the means of the score results for all age/gender groups included in the aptitude test.

The intergenerational rate of retention (RG) indicates the rate of retention between any successive pair of age groups and is calculated as the ratio of the generation mean to that of the generation immediately preceding it. The cumulative rate of retention (RC) essentially reflects the proportion of the baseline aptitude level retained by each succeeding age group. The formula used for RC is adapted from that used to calculate the Living Planet Index (Loh et al. 2005), since they have similar purposes (i.e. measuring retention over time based on sample data). The annual rate of change (CA) expresses the average rate and direction of change per year reflected by the target age group. Significance tests are used to assess whether the trends calculated by the vitality index signal significant differences (i.e. changes) in knowledge between generations.

The VITEK measures (RG, RC, CA) can be aggregated according to different scales of inclusiveness, from the local community on up to the entire globe, depending on data availability. At the same time, these measures can be disaggregated according to individual TEK domains in order to assess which types of knowledge are more/less susceptible to erosion or change.

#### 4. Applications of the VITEK

According to the Pressure-State-Impact-Response (PSIR) model of indicator classification, the VITEK would be categorized as a “state” type of indicator, which refers to the quality or state of the environment. In this case, it represents the rate of retention/loss of TEK and its constituent domains over time.

The method defined here is designed to produce measures of vitality through a one-time implementation of the assessment. This is achieved by an inferential procedure involving the measurement of differences in TEK aptitude between age groups. Thus the initial application of the assessment test will provide trend information with a maximum time depth of approximately 50 years (the difference between the youngest and the oldest testable age cohorts in the respective study groups).

The ideal application of the VITEK, however, would be to repeat the assessment at regular time intervals, which would produce true time-series data. This would permit more direct and accurate measures of the rates of change as a function of the differences

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recorded between the preceding and the subsequent observations. In that sense, the main goal of the VITEK is to lay the groundwork for building a reliable indicator of TEK continuity or change that will be used on a sustained basis.

By providing a simple, synthetic, comparable, empirically-based measure of knowledge change in different places, the VITEK has a number of useful applications and should be of interest to different user groups. Dissemination of the results to the local communities will help to raise their awareness of the healthy/unhealthy state of their cultural heritage, and therefore stimulate them to consider the need for preservation or recuperation initiatives. By translating the direction and degree of change that traditional knowledge is undergoing in terms of the universal language of mathematics, it will also enhance their ability to communicate such needs to outside actors such as policymakers and aid providers. Furthermore, the protocol puts emphasis on involving local community members in the data-collecting process and training them in the methodology so that they can do the assessment on their own in the future. This should give them greater control over the information and its application.

For national and international policymakers, the VITEK affords an efficient tool for assessing the current and changing states of TEK in different places. Thus it can be used to identify endangered situations and target conservation actions where they are most needed. The periodic application of the assessment would provide an objective basis for monitoring trends in traditional knowledge persistence or erosion over time at different geographic scales. It can also serve as a yardstick for evaluating policy performance or outcomes, thus contributing to the process of accountability.

For researchers, the VITEK provides a comparative indicator of TEK variation and change which, if analyzed in relation to other cultural and environmental variables, can be used to test hypotheses about the causes of knowledge loss or persistence or the importance of it for biodiversity conservation. For example, an examination of the correlation of the VITEK indicator and indicators of species richness or forest cover change could shed

light on the interdependence of biological and cultural diversity. In a similar vein, the comparison of the VITEK and the Linguistic Vitality Test (Florey 2006) constitutes a potential test of the relationship between local language and TEK.

Finally, as a simple, easy-to-read indicator, the VITEK can be used to educate and inform the general public about the impact of contemporary social and environmental change on the knowledges and lifestyles of different cultural groups. Informed public opinion constitutes one of the major drivers of lifestyle and policy change, and in that sense the VITEK potentially contributes to the protection and maintenance of biocultural diversity.

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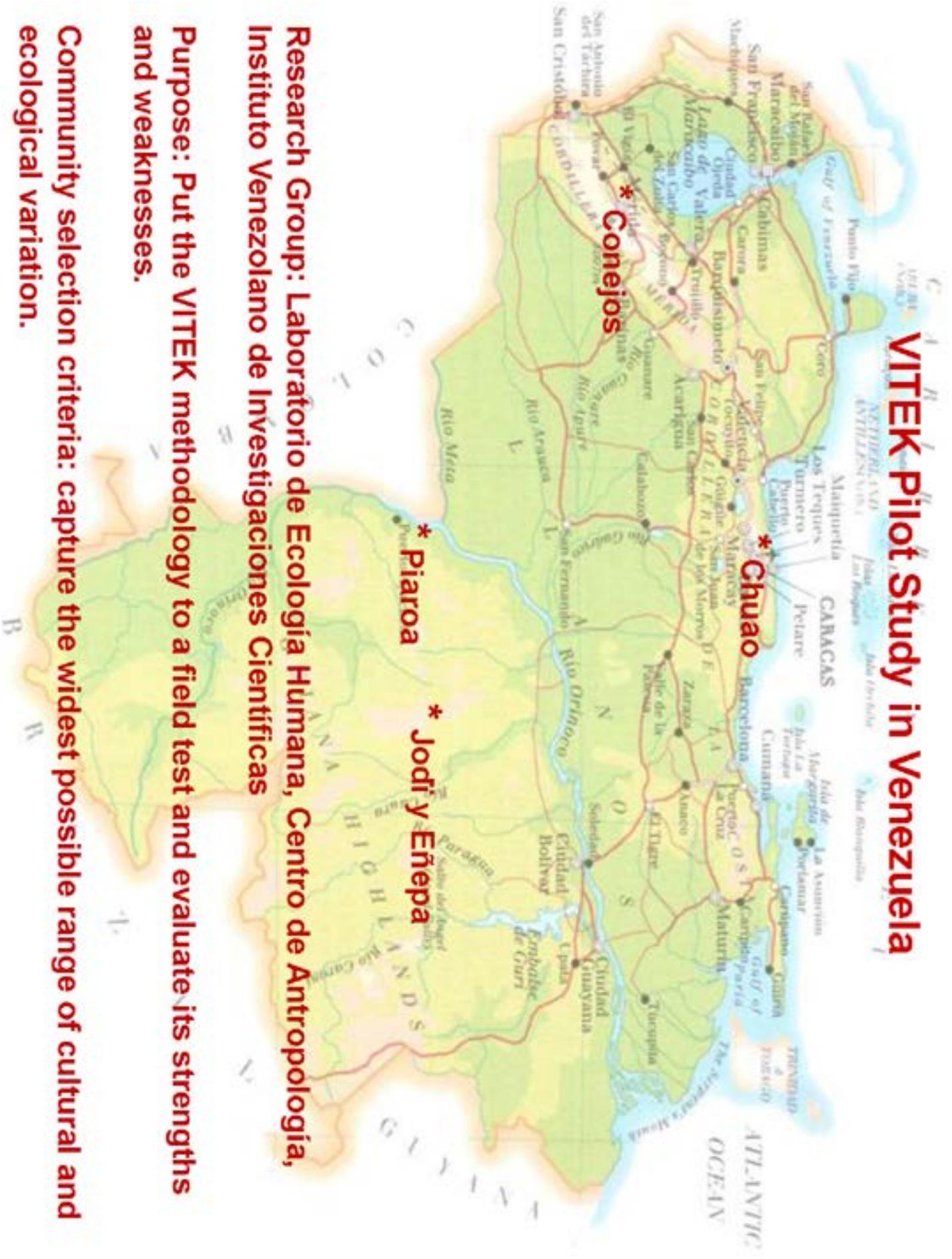
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NOTE: For the complete description of the VITEK and complete bibliographic references, you can download the above report from the VITEK website: [www.terralingua.org/vitek/downloads/](http://www.terralingua.org/vitek/downloads/) by clicking on "VITEK Report – full".

#### (Endnotes)

1 Modified and updated from: Zent, S.R. 2008. The VITEK: A Quantitative Measure of the Transmission of Traditional Environmental Knowledge. Working paper prepared for the panel "Measuring and Monitoring State and Trends in Biodiversity and Culture", International Symposium "Sustaining Cultural and Biological Diversity in a Rapidly Changing World: Lessons for Global Policy," American Museum of Natural History, New York, N.Y., U.S.A., April 2-5, 2008.

# VITEK Pilot Study in Venezuela



**Research Group:** Laboratorio de Ecología Humana, Centro de Antropología, Instituto Venezolano de Investigaciones Científicas

**Purpose:** Put the VITEK methodology to a field test and evaluate its strengths and weaknesses.

**Community selection criteria:** capture the widest possible range of cultural and ecological variation.



# A VITEK Case Study

Stanford Zent

## Pilot Study of the VITEK in Chuao, Venezuela

A pilot study of the VITEK method was carried out in Chuao Parish, Aragua State, República Bolivariana de Venezuela by a team from the Instituto Venezolano de Investigaciones Científicas (IVIC) in collaboration with members of the community. The purpose of the pilot study was to evaluate the feasibility, practicality and efficiency of the method and use this experience to improve it if needed.

Chuao is well known throughout Venezuela for its high-quality cacao and colorful ceremonial pageants. It is located on the Caribbean coast and is only accessible by boat from the sea or on foot by land. The town has a current population of approximately 3,000 and its ethnic makeup is predominantly *criollo* (i.e. people of mixed ancestry) with a strong Afro-Latin American biocultural element. While a number of inhabitants can recall having an Amerindian ancestor, no one speaks an indigenous language. The main economic activities are agriculture (both family-managed swidden plots and a company-run cacao plantation), maritime fishing (for local consumption and sale), tourism-related businesses and public sector jobs. Most people are Roman Catholic Christians but syncretic spiritual beliefs and practices (e.g. derived from *Santería* and *María Lionza*) are also commonplace. In recent years, a large number of young adults have moved away to distant urban areas in search of jobs or educational opportunities but this loss has been more than compensated by new arrivals from outside the region.

The VITEK assessment carried out in Chuao encompassed a number of domains that correspond to conceptual or theoretical-type knowledge (i.e.

*connaissance*), such as: plants, animals, plant-animal relationships, biotopes (or biological communities), soils, climate and ethnogeographic places. It also covered knowledge embodied in practical skills (i.e. *savoir-faire*), in this case: agricultural skills, animal husbandry, hunting, fishing, collecting/gathering, food processing and preparation, ethnomedical practices, craft and tool-making, and building construction. Throughout the entire process of compiling the community register of TEK data and developing the assessment test, men and women were treated as separate cases.

The test included multiple choice and true-false questions pertaining to each one of the domains mentioned above and the overall test composition reflected local ideas about the relative importance of these for the social and material reproduction of their lifestyle. Administration of the test was limited to adults only and only after the subject was informed of the objectives and applications of the test and had freely signed a consent form. The sample of test subjects was selected randomly from a community census and consisted of comparable numbers in all age and sex groups. The generation interval (27 years) used for this study was based on demographic data supplied by a sample of women from the community. The lower age limit used to define the youngest cohort of adults (18 years old in the case of men and 15 years old in the case of women) was determined according to local opinions about the age when intellectual maturity should be reached. The statistical results of the test were calculated and analyzed at three levels of inclusion: total test, component (conceptual, skills) and domain (see above).



## Results

A few results of the Chuao assessment are presented in the figures and table below in order to demonstrate how it works. Figure 1 shows the cumulative retention trend for the total test, all test subjects included. The results show that TEK in general has declined by 12.5% from the eldest to middle generation (G<sub>0</sub> and G<sub>1</sub> respectively) and by a further 19% from the middle to youngest generation (G<sub>1</sub> and G<sub>2</sub> respectively), thus accounting for a cumulative decline of nearly 30% when comparing the eldest and youngest age groups. Figure 2 shows the same plot but with split trendlines according to gender group. Here we see that women in the community have been able to retain more TEK across generations than men have. The cumulative decline in women from the eldest to the youngest cohorts is 23% whereas the corresponding decline in men is 37%. From these sets of data, we may surmise that men are less likely to retain the TEK of their fathers and grandfathers, and for both sexes the declining trend is noticeably sharper among the youngest generation of adults.

Table 1 shows the annualized rate of change according to age and gender groups and by component and domain. Some of the results are color-coded to highlight especially significant negative or positive trends for the generation group in question compared to the preceding generation group. Thus yellow indicates a significant decrease in knowledge (loss rate of  $\geq 1\%$  per year), red indicates a very sharp

decrease (loss rate of  $\geq 2\%$  per year) and blue indicates a significant increase in knowledge (loss rate of  $\geq 1\%$  per year). For the combined sample (both sexes) and averaging the change rate for both of the junior generations, both the conceptual and skills components register significant declines (loss rate of  $\geq 1\%$  per year). However, when the male and female samples are considered separately, we see that this level of decline occurs only among the men.

The individual knowledge domains displaying a significant rate of decline for the combined sample are: plants, interspecific relationships, biotopes, soils, ethnomedicine, craftwork and construction. Of these, the rates are greatest for knowledge about interspecific relationships (-0.017/yr.), construction skills (-0.016/yr.) and ethnomedicine (-0.014/yr.).

Among the male sample, significant declines can be observed for the plant, interspecific relationships, ethnogeographic places, soils, climatic, food processing and ethnomedical domains, and the loss of construction skills is the most dramatic (-0.020/yr.). By contrast, a significant increase was recorded for fishing knowledge (+0.010), probably due to the growth of commercial fishing as an economic activity during the past 2-3 decades, while ethnozoological knowledge, which obviously includes fish but is not limited to that group, was flat (0.000). Among the female sample, the domains showing significant declines were: animals, interspecific relationships, biotopes, collection, ethnomedicine, craftwork and construction. The only domain that exhibited an increase was animal husbandry.



In sum, the domains which stand out as yellow- or red-coded give us an idea of which types of knowledge have experienced erosional processes and may be threatened in the future if remedial action is not taken.

By looking at how the trends are differentially distributed by generation groups we can see which sectors of the population are being excluded from the knowledge transmission process. This type of information may be useful when deciding how and where to target interventions. At the total test level, the most significant decline (-0.017) was recorded for the younger generation of males. It is also among this same cohort that we find the largest number of domains that are declining at a significant level. Ten out of the 17 domains included in the study exhibit CA values of -0.01 or less. Of these, six (plants, ethnogeographic places, fishing, collecting, ethnomedical and construction) are declining at the drastic rate of 2% per year or more. Among men of the middle generation, declines at the 1-1.99% per year level were observed in the domains of biotopes, soils, food processing, craftsmanship and construction, and

at the more critical 2+% per year level for interspecific relationships, climate, animal husbandry and hunting. These data tell us that the specialized knowledge associated with several different domains has been undergoing an erosional process for at least several decades and there is no sign that this downward trend is letting up in more recent years.

Among women, the middle generation (G<sub>1</sub>) exhibits significant declines in a larger number of domains than does the youngest generation (G<sub>2</sub>) (7 versus 6 respectively) but the pattern of difference between these two generations is starkly contrastive according to which domain is considered. Whereas critical losses going from G<sub>1</sub> to G<sub>2</sub> are recorded in the domains of interspecific relationships (-0.026), biotopes (-0.023) and construction (-0.021), significant or slight increases are observed in the cases of hunting (+0.033), climate (+0.019), animal husbandry (+0.005) and fishing (+0.001). One general conclusion that can be drawn from these results is that an understanding of TEK retention or loss in this community requires multiple measures disaggregated by semantic domain and sociodemographic group.

Figure 1. Cumulative Retention Trend: Total Test, All Subjects

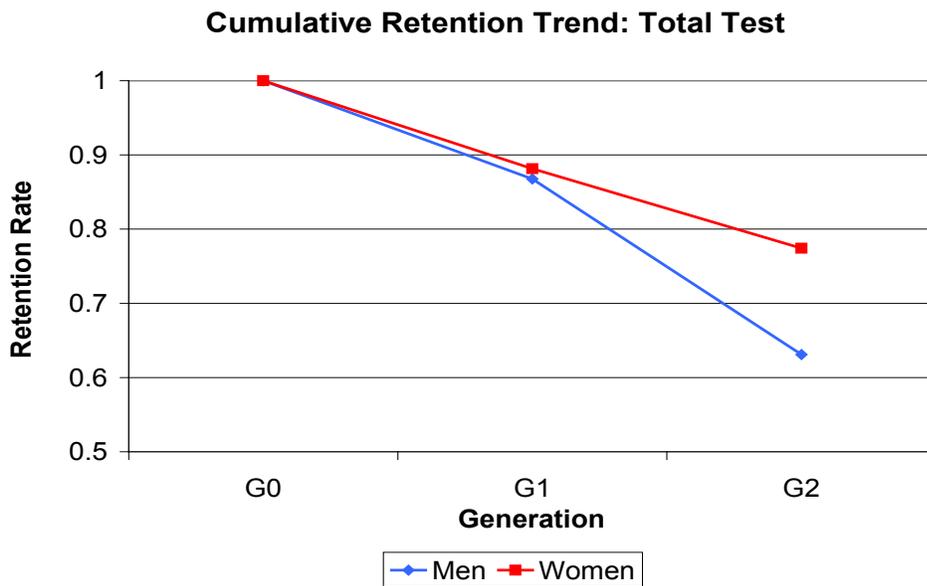
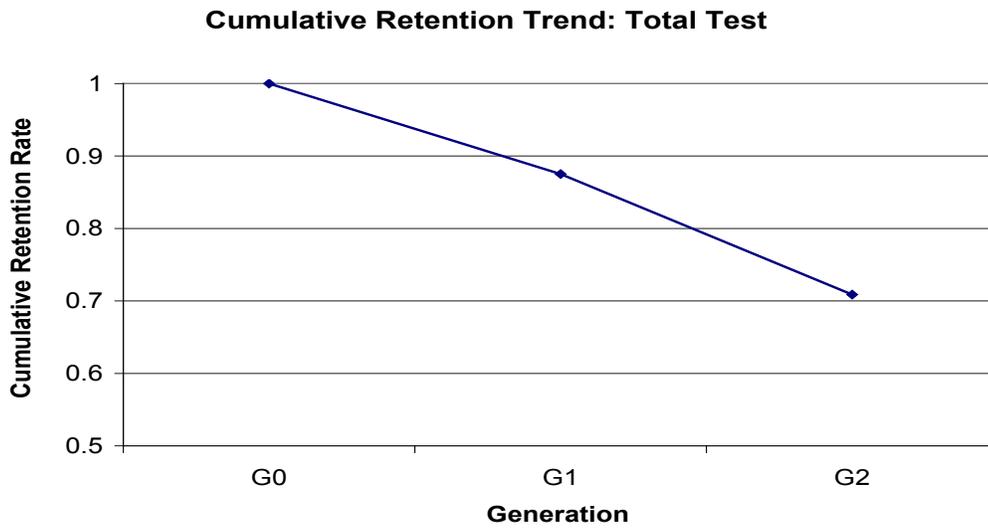


Figure 2. Cumulative Retention Trend: Total Test, Men and Women

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Table Key:

<sup>1</sup> TOT: Total Test (all components, all domains)

<sup>2</sup> CC: Conceptual Component (consisting of the aggregate of plant, animal, interspecific relationships, biotopes, ethnogeographic places, soil and climatic domains).

<sup>3</sup> HP: Skills Component (consisting of the aggregate of agriculture, pastoralism, hunting, fishing, collection, food processing, ethnomedicine, craftwork and construction domains).

<sup>4</sup> BO: Plant domain.

<sup>5</sup> ZO: Animal domain.

<sup>6</sup> RE: Interspecific relationships domain.

<sup>7</sup> BI: Biotopes domain.

<sup>8</sup> EG: Ethnogeographic place domain.

<sup>9</sup> SO: Soil domain.

<sup>10</sup> CL: Climatic domain.

<sup>11</sup> AG: Agricultural practice domain.

<sup>12</sup> AH: Animal husbandry domain.

<sup>13</sup> HU: Hunting practice domain.

<sup>14</sup> FI: Fishing practice domain.

<sup>15</sup> CO: Collecting-gathering practice domain.

<sup>16</sup> FP: Food processing and preparation domain.

<sup>17</sup> EM: Ethnomedical practice domain

<sup>18</sup> CR: Craftwork domain.

<sup>19</sup> CN: Housebuilding and general construction domain.

<sup>20</sup> MG<sub>0</sub>: Male Generation 0 (oldest, age range shown)

<sup>21</sup> MG<sub>1</sub>: Male Generation 1 (middle, age range shown)

<sup>22</sup> MG<sub>2</sub>: Male Generation 2 (youngest, age range shown)

<sup>23</sup> MG<sub>1&2</sub>: Male Generations 1 and 2 taken together

<sup>24</sup> FG<sub>0</sub>: Female Generation 0 (oldest, age range shown)

<sup>25</sup> FG<sub>1</sub>: Female Generation 1 (middle, age range shown)

<sup>26</sup> FG<sub>2</sub>: Female Generation 2 (youngest, age range shown)

<sup>27</sup> FG<sub>1&2</sub>: Female Generations 1 and 2 taken together

<sup>28</sup> BG<sub>0</sub>: Both Male and Female Generation 0 (oldest, age range shown)

<sup>29</sup> BG<sub>1</sub>: Both Male and Female Generation 1 (middle, age range shown)

<sup>30</sup> BG<sub>2</sub>: Both Male and Female Generation 2 (youngest, age range shown)

<sup>31</sup> BG<sub>1&2</sub>: Both Male and Female Generations 1 and 2 taken together

 : indicates a significant decline from previous generation equivalent to a loss of <sup>3</sup> 0.01 (1%) per year.

 : indicates a very sharp decline from previous generation equivalent to a loss of <sup>3</sup> 0.02 (2%) per year.

 : indicates a significant improvement from previous generation equivalent to a gain of <sup>3</sup> 0.01 (1%) per year.

Table 1. Annualized Rate of TEK Change in Chuao.

|                                                |                  |                 |                 |                 |                 |                 |                 |                 |                 |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
|------------------------------------------------|------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
|                                                | TOT <sup>1</sup> | CC <sup>2</sup> | SC <sup>3</sup> | BO <sup>4</sup> | ZO <sup>5</sup> | RE <sup>6</sup> | BI <sup>7</sup> | EG <sup>8</sup> | SO <sup>9</sup> | CL <sup>10</sup> | AG <sup>11</sup> | AH <sup>12</sup> | HU <sup>13</sup> | FI <sup>14</sup> | CO <sup>15</sup> | FP <sup>16</sup> | EM <sup>17</sup> | CR <sup>18</sup> | CN <sup>19</sup> |
| <b>Men</b>                                     |                  |                 |                 |                 |                 |                 |                 |                 |                 |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| MG <sub>0</sub> <sup>20</sup><br>(54-75)       | 0.000            | 0.000           | 0.000           | 0.000           | 0.000           | 0.000           | 0.000           | 0.000           | 0.000           | 0.000            | 0.000            | 0.000            | 0.000            | 0.000            | 0.000            | 0.000            | 0.000            | 0.000            | 0.000            |
| MG <sub>1</sub> <sup>21</sup><br>(27-53)       | -0.009           | -0.010          | -0.008          | -0.006          | 0.001           | -0.021          | -0.014          | -0.006          | -0.011          | -0.025           | 0.006            | -0.020           | -0.023           | 0.047            | 0.013            | -0.012           | -0.009           | -0.010           | -0.014           |
| MG <sub>2</sub> <sup>22</sup><br>(18-26)       | -0.017           | -0.017          | -0.018          | -0.025          | -0.002          | -0.016          | -0.003          | -0.025          | -0.019          | -0.006           | -0.019           | 0.004            | 0.005            | -0.027           | -0.022           | -0.016           | -0.027           | -0.009           | -0.025           |
| MG <sub>1&amp;2</sub> <sup>23</sup><br>(27-53) | -0.013           | -0.013          | -0.013          | -0.016          | 0.000           | -0.018          | -0.008          | -0.016          | -0.015          | -0.015           | -0.006           | -0.008           | -0.009           | 0.010            | -0.005           | -0.014           | -0.018           | -0.009           | -0.020           |
| <b>Women</b>                                   |                  |                 |                 |                 |                 |                 |                 |                 |                 |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| FG <sub>0</sub> <sup>24</sup><br>(54-72)       | 0.000            | 0.000           | 0.000           | 0.000           | 0.000           | 0.000           | 0.000           | 0.000           | 0.000           | 0.000            | 0.000            | 0.000            | 0.000            | 0.000            | 0.000            | 0.000            | 0.000            | 0.000            | 0.000            |
| FG <sub>1</sub> <sup>25</sup><br>(27-53)       | -0.008           | -0.008          | -0.009          | -0.002          | -0.013          | -0.003          | 0.003           | -0.006          | -0.003          | -0.023           | -0.010           | 0.020            | -0.021           | -0.014           | -0.007           | 0.002            | -0.013           | -0.019           | -0.004           |
| FG <sub>2</sub> <sup>26</sup><br>(15-26)       | -0.008           | -0.011          | -0.006          | -0.014          | -0.013          | -0.026          | -0.023          | -0.008          | -0.008          | 0.019            | -0.002           | 0.005            | 0.033            | 0.001            | -0.013           | -0.009           | -0.008           | -0.008           | -0.021           |
| FG <sub>1&amp;2</sub> <sup>27</sup><br>(15-53) | -0.008           | -0.009          | -0.007          | -0.008          | -0.013          | -0.015          | -0.010          | -0.007          | -0.006          | -0.002           | -0.006           | 0.013            | 0.006            | -0.006           | -0.010           | -0.004           | -0.011           | -0.013           | -0.013           |
| <b>Combined</b>                                |                  |                 |                 |                 |                 |                 |                 |                 |                 |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| BG <sub>0</sub> <sup>28</sup><br>(54-75)       | 0.000            | 0.000           | 0.000           | 0.000           | 0.000           | 0.000           | 0.000           | 0.000           | 0.000           | 0.000            | 0.000            | 0.000            | 0.000            | 0.000            | 0.000            | 0.000            | 0.000            | 0.000            | 0.000            |
| BG <sub>1</sub> <sup>29</sup><br>(27-53)       | -0.009           | -0.009          | -0.008          | -0.004          | -0.007          | -0.012          | -0.007          | -0.006          | -0.007          | -0.024           | -0.005           | -0.002           | -0.022           | 0.003            | 0.000            | -0.005           | -0.011           | -0.014           | -0.009           |
| BG <sub>2</sub> <sup>30</sup><br>(15-26)       | -0.013           | -0.014          | -0.012          | -0.020          | -0.008          | -0.023          | -0.014          | -0.017          | -0.013          | 0.009            | -0.009           | 0.005            | 0.015            | -0.015           | -0.017           | -0.014           | -0.017           | -0.008           | -0.023           |
| BG <sub>1&amp;2</sub> <sup>31</sup><br>(15-53) | -0.011           | -0.011          | -0.010          | -0.012          | -0.007          | -0.017          | -0.011          | -0.011          | -0.010          | -0.007           | -0.007           | 0.001            | -0.003           | -0.006           | -0.009           | -0.009           | -0.014           | -0.011           | -0.016           |



# The VITEK In Practice: A Quick-Step Guide

Stanford Zent

## Introduction

Welcome to the VITEK assessment quick-step methods guide! By following these few easy steps, you can begin to measure and analyze the dynamic states and trends of traditional environmental knowledge (TEK) in your study neighborhood, and compare the results with other communities in which the same method has been applied. The method elaborated is completely new, which means that if you choose to put it into practice then you are a true pioneer in intraplanetary understanding!

## Step 1.

Give a written summary or an oral explanation of the project description, or both of these, to key members and organizations belonging to the target community.

- The project description should state clearly the project objectives, methods, estimated duration, and intended use of the results.
- Ask them for their prior informed consent to participate in the assessment. The consent can be either oral or written, according to prevailing local customs, national laws, institutional regulations, etc.
- To mollify concerns about intellectual property rights, third party access to valuable or sensitive information, or other touchy issues, you may want to explain that the only information that will be taken away from the local community will be numbers, that is, statistical calculations referring to the vitality (i.e. rate of retention/change over time) of local TEK.
- We also recommend that you commit to providing the results of the study to the local community before any other target group, as a way of guaranteeing that return of information is carried out as soon as possible.
- If permission is granted, offer to make members of the community active partners in the project. Ask if any local person(s) might be interested in learning how to do the assessment method so that they can do so in the future on their own. Discuss what possible benefits and advantages the development of this capability might have for them.

## Step 2.

Once the project consent is secured, ask and arrange for small focus-group meetings with locally recognized experts.

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- The meetings should be held independently for males and females unless it can be established that there should be no significant differences in knowledge by gender. Basically, all steps of the method described below should be performed on a gender-separate basis until the final overall group index calculations are made (see step 13).
  - If it is impossible to assemble more than one person in the same place at the same time, then individual interviews are an acceptable alternative. However, if this option is used then the answers supplied by the individuals must be combined and averaged.

### Step 3.

In the context of the focus-group meetings (or individual interviews), define the semantic domains that make up the local TEK system.

- The VITEK protocol specifies a predetermined list of cosmopolitan semantic domains. We call them as such to convey the idea that they are delimited fields of meaning and action that are (potentially) identifiable in a wide number of biocultural situations throughout the world (but are not necessarily universal). The general purpose of starting with this list, rather than a blank slate, is to permit meaningful and controlled comparisons from one group to the next. However, it should be emphasized that this list is no more than a starting point, a menu of possibilities, that should be adapted to local categories or frames of significance.
- First, review the preselected list of cosmopolitan domains (see appendix 1), going down the list one domain at a time. For each domain, ask the participants whether they can recognize it or if it is relevant and important for their lives. Is there a local term, or close equivalent, that labels the domain? Check off and include any domain that is perceived as familiar, salient or important by them. If any domain is considered to be unknown or irrelevant, then just discard it. Ask if there are any other domains not shown on the list but are important to them. If they reply in the affirmative and are able to tell you what they are, then add them to the list.
- The trick here is to be able to communicate effectively, moving from the cosmopolitan list to a local one. You may have to rephrase the label of the cosmopolitan domain so that they can understand what you are getting at. A process of creative and flexible dialogue is recommended.
- The method described here, starting with the complete list appearing in appendix 1, is intended to provide a (more or less) comprehensive assessment of the local TEK corpus. However, let's say that you or the community is only interested in a more focused assessment, such as a single domain, due to specialized research interests or a very tight calendar. For instance, you might be interested only in the knowledge and use of palms (Arecaceae) or weaving techniques. Keep in mind, however, that such preselection of the domain(s) does not obviate the need to translate it/them from the category as defined by the researcher to the category as recognized and conceptualized by the target group. Thus, you may have to verify that the latter have a category for 'palm plant' or 'weaving', or discern how these are subsumed or distributed among different categories. In short, do a partial assessment if you cannot do a full one but use the same set of procedures to establish local semantic frames.

### Step 4.

Once the list of local TEK domains is defined, you need to assign weights to each one.

- You will notice that the list of cosmopolitan domains is divided into two distinct groupings. The first deals with conceptual knowledge ("know-what") and the second refers to practical skills ("know-how"). Because these types of knowledge constitute fundamentally different epistemological forms, we consider

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that they are not directly comparable. Therefore the exercise of assigning weights will have to be limited to the constituent domains within each one.

- Ask the local consultants to rate the relative importance of each domain out of a total of a hundred points (e.g. 15 points for plants, 10 points for animals, etc.). When doing this, be sure to clarify that you are asking them to compare and contrast the importance of the *knowledge* associated with the domain and not the biophysical phenomena themselves. If you are not careful about how this is worded, then we expect that some people will respond, quite logically, that it is impossible to consider one part of the physical environment as more important than another given the inherent interconnection and interdependence of elements. However, what we really want them to weigh is the relative importance of one type of knowledge as opposed to another (e.g., plant lore versus animal lore), so use the appropriate language to get this idea across. This procedure can be carried out by direct verbal elicitation for numerate populations or by using the “stone-distribution” scoring technique (i.e. presenting cards on which each domain is written or depicted, providing 100 small stones, seeds, chips or other objects, and asking them to assign a number of these to each card that reflects the cultural importance of the domain) for non-numerate populations.
- If the consultants are unable to make such numeric judgements, assume that all domains are equally weighted.

### Step 5.

Compile a free list of categorical items that make up each domain.

- You should ask the consultants to name the “things” or entities that are culturally significant in each domain. For example, what are the kinds of plants that they know and use, the soil classes that they can identify, the types of agricultural labor that they do, the different craft items that they make, etc. Record no more than 100 items per domain (that should be more than enough, in some cases much less). If the consultants cannot name that many, then stop trying when they say they cannot think of any more.
- Once again, the key to this exercise is to be able to communicate effectively about what you want. You may have to provide some examples before they get the basic idea. Some domains are more natural cognitively, and thus more accessible or easier to elicit the contents, such as plants, animals and soil types. Others are not as easy to recognize or talk about in an abstract manner, such as biotopes and climate. In the case of domains such as these, a more fluid, interactive and perhaps contextually appropriate approach may be needed to discover and record the inventory of relevant categorical items.
- Please note that if individual, rather focus group, interviews are employed and the total inventories of items add up to more than the maximum amount per domain allowed here, then the ranking procedure described in step 6 that follows can be used to eliminate all items after the top-ranked 100.

### Step 6.

Arrange the domain-specific list of items into a rank-ordered list according to local criteria.

- Ask the consultants to rank the list according to their own criteria of cultural importance value. If the list is long, ask them to name the 10 most important items. Then ask them to order that group of 10. Then elicit the next 10 most important items and their ranked order, and so on, until an ordered list for the entire domain is completed. An alternative ranking method would be to ask them to assign to each item a value on a scale of 1 to 10. After this initial valuation, ask them to order each group of items given the same score. Put all of the ordered lists together to form the entire ranked list.

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- Divide the list into three groups, reflecting high, middle, and low ranking. Code each item according to the ranked group it belongs to. This coding will be important for selecting which items are included within the test instrument (see step 11 below).

### Step 7.

Record subsidiary information about each categorical item.

- After the names of categories are recorded by free-listing, record other cultural information such as: use value or other type of significance, identifying characteristics, associated activities (for conceptual domain categories) or associated resource objects (for practical domain categories). Please use the guide provided with the cosmopolitan domain list (appendix 1) to get an idea of what kind of subsidiary information should be collected, given that this will vary according to the domain in question).
- As mentioned above, this list is merely a starting point and can be modified, attenuated or elaborated according to the opinions of the consultants or even according to special research interests.

### Step 8.

Prepare stimulus materials that may be used in the test instrument as a visual supplement to verbal or text-based questions or cues.

- These will consist mainly of photos, illustrations and/or specimen samples of the categorical items that are named in step 5.
- This phase may require excursions around the community's environs or perhaps local people can be employed to collect these materials.
- The particular stimulus materials prepared will depend on the type of domain and nature of its constituent entities, their accessibility to such recording or collection, and the ability of the medium to provide a reliable and accurate representation of the item in question. For example, photos may be used to depict plant and animal species but may not be feasible for landscape units or weather elements.
- The perceptual clarity or transparency of photos of plants or soils or other types of objects should be pretested on a small sample of people (5 items tested on 5 people should be enough to do this) in order to determine whether they provide an appropriate stimulus or not. If the answer is no, then specimen collections, when possible, should be considered.
- Certain animal species or other items may not be easily located but perhaps pictures or drawings obtained from field manuals or even the internet may be available. For bird species, maybe recordings of their songs would be better. The visual representation of culturally significant places may be better done on so-called mental maps that are hand-drawn.
- The investigator can be creative about this but should always consider carefully whether the representation provides a reliable perceptual cue of the item. If the cue is not a good one, then obviously it should not be used. In any case, this is merely a supplement that is intended to enhance the quality and objectivity of the test instrument. The advantage of using such stimulus materials is that it helps to overcome the limits and biases imposed by merely language-encoded cues.
- Hint: a shortcut to this step can be taken by preparing the stimulus materials AFTER the test instruments are made up. In that case, you only have to prepare materials referring to the categorical items that actually appear in the test.

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## Step 9.

Make or get a reasonably complete and up-to-date census of the human community where the assessment is being done.

- The minimum amount of social data that should appear in the census is the person's name, their age and sex.
- If preexisting census data exists, definitely use it (as long as it is reliable).
- Divide the population into two groups by gender and assign a number or code to each person (the order is not important).

## Step 10.

Select the sample of persons who will be tested.

- As alluded to above, the sample will be stratified minimally by age and sex.
- Other social variables (e.g., education, occupation, ethnicity) could be included in the analysis if the researcher or community groups wish to do so, in which case the sample (and the census) will have to take them into account.
- The population has already been divided into gender groups, as described above (see step 9). We also wish to divide the population into generation groups. Ideally, the length of the generation interval should be determined according to the particular sociodemographic parameters of the target population. The most precise and reliable way to do this is by combining population-specific life table calculations with fertility schedules by age cohort. A much simpler but reasonably accurate method is to take the average midpoint of the age interval that corresponds to the reproductive careers of a sample of persons from the target population. Thus for a sample of women of post-fertile age you record their age at birth of first child and age at birth of last child (please note that only live births count), and then figure the midpoint of these. The mean value of the midpoints is the estimate of generation length for that population. This calculation is normally based on women's performance since they are the key reproducing members of a population. However, you could also do it separately for men and women although the identification of post-reproductive males is less clearcut. We suggest that you could assume that a man who has had no children in the last 10 years is effectively post-reproductive. If you're not into demographic data collection at all, then you can probably get by using a standard generation interval size of 25 years. In fact, that is what archaeologists do with respect to prehistorical modern human (i.e. Cro-Magnon) populations. In most groups, this leaves you with four generation groups: 0-24, 25-49, 50-74, and 75-99. At the same time, we wish to limit the assessment to that sector of the population considered to be intellectually mature from a TEK standpoint. (Note: if the research group wishes to include children or immature people in the assessment, then they should feel free to do so, but this cohort should be excluded from the calculations described in step 13 below).
- To determine the age at which "TEK maturity" is hypothetically reached, you should ask your consultants to define what that age should be. Based on their estimate, all individuals below that age should be eliminated from consideration for the sample selection. Thus, for example, if the cutoff age is 15 years old and the standard 25-year interval is used, the generation groups will be defined as: 15-24, 25-49, and 50-74. It may not be feasible to find enough individuals for testing beyond this range or age-dependent decline of physical/mental health may make it difficult to achieve meaningful results through the type of testing contemplated here, so to play it safe we recommend limiting the test to these three groups. This leaves us with at least six age/gender groups for testing.

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- Each person in the respective groups should be assigned a number or code and a random selection of at least five persons should be made for each of the test groups.
  - If anyone who is selected doesn't want to participate, then just select someone else (and so on) until the roster of all groups is complete.
  - In all, you should have selected at least 30 subjects for testing, 5 in each age/gender group.

### Step 11.

Make up the TEK aptitude test (TEKAT).

- The test consists of two main sections: (a) conceptual knowledge component and (b) practical skills component. The respective sections will include questions drawn from the local domains and the categorical items that were recorded for them in steps 3 and 5 above.
- The relative composition of each section should directly reflect the weights assigned in step 4 above. For example, if the plant domain was assigned 20 out of 100 points, then 20% of all questions in the conceptual knowledge component should be drawn from that domain.
- The selection of categorical items within the domain should be performed using a random selection process, taking care to divide the selection according to the three ranked groupings (see step 6). Thus for plants, one-third would be drawn from the highest-ranked group, one-third from the middle-ranked group, and one-third from the lowest-ranked group. The idea here is to distribute questions among more to less common types of knowledge and therefore achieve a more comprehensive and representative test of the total TEK corpus.
- In making up the questions, we recommend that the conceptual knowledge be constructed with true/false or multiple choice questions, or a combination of these. For the practical skills component, it will probably be best to use self-reporting questions with some sort of follow-up verification query: e.g. Have you ever built a canoe? If the answer is yes, ask when was the last time you did so or whether you done so in the past year. For certain domains within this component, such as food preparation or ethnomedical practices, true/false and multiple choice formats can be used.
- Stimulus images should be used where appropriate (e.g. showing a picture of an animal and asking the subject to select the correct name from a list of five names or asking them to specify true or false whether it is nocturnal).
- We recommend that each section of the test last no more than one hour. Figuring one minute per question, that puts a limit of 60 questions per section.
- Three alternative versions of the test should be prepared for each section (so that not everyone takes the same exact test). Also remember that separate tests will be compiled for men and for women (although there may be some overlap of content between them). So in all a total of six test versions per section will be prepared.
- Make sure that all of the alternative test versions have the same proportion of multiple choice, true/false, and self-report type questions and that the proportions of these in each domain is also the same.

### Step 12.

Administer the TEKAT to the sample of subjects selected in step 10.

- The test should be given on a strictly individual basis, preferably in a location secluded from onlookers or others. You may want to provide a snack before beginning each section to keep the blood sugar flowing

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to the brain!

- We recommend that you have someone from the community help to administer the test and record the answers, especially if the test subject speaks only a local language or is more likely to respond better to someone they are familiar with. Conceivably, the test could be self-administered if the subject is literate. If you're computer-savvy maybe you can even put the test into an interactive program that automatically records the answers in digital form as the person takes the test, saving one step in data-processing.
- The specific test given to each subject should be selected randomly from the three gender-specific versions that were prepared (see step 11).
- The test given to a person should be marked or identified with the code of that person to ensure the confidentiality of the results.
- The scoring of the test should be as simple and straight-forward as possible. The effect of guessing on the test results should be reduced by penalizing wrong answers and by supplying an "I don't know" or "no answer" option for each question. Make sure, however, that you inform the test subjects of this or just ask them to refrain from guessing if they aren't sure about the answer. Thus the raw scores can be computed by counting +1 for every correct answer and 0 for every blank or "I don't know" answer. Incorrect answers are scored negatively in direct proportion to the number of wrong possibilities they have to guess from. In a multiple choice format with 5 answer choices, every incorrect answer is scored as  $-1/4$ . In a strictly dichotomous true/false format, every incorrect answer is scored as  $-1$ .
- The final raw score should be adjusted so that the minimum score possible is no less than 0.

### Step 13.

Calculate the key VITEK statistics using the supplied formulas.

- The VITEK consists of three related measures: the intergenerational rate of retention (RG), the cumulative rate of retention (RC), and the annual rate of change (CA).
- RG indicates the rate of retention between any successive pair of age groups and is calculated as the ratio of the generation mean to that of the generation immediately preceding it (see appendix 2 for calculation).
- RC reflects the proportion of the baseline aptitude level retained by each succeeding age group (see appendix 2 for calculation).
- CA expresses the average rate and direction of change per year reflected by the target age group (see appendix 2 for calculation).
- Significance tests can be used to assess whether the trends calculated by the vitality index signal significant differences (i.e., changes) in knowledge between generations.
- The VITEK measures (RG, RC, CA) can be aggregated according to different scales of inclusiveness. The first aggregation that should be performed involves combining the results for both gender groups together. This gives you a single set of measures for the whole community. If you have results from more than one community, district, state or country, you can also put these together to produce a composite measure.
- All of the VITEK measures described here can also be disaggregated according to individual TEK domains in order to assess which types of knowledge are more/less susceptible to erosion or change. This type of more fine-grained analysis can also be used to explore variations in knowledge change between gender groups.

### Step 14.

Report the results to the target community and offer to discuss their significance.



*Previous Informed Consent Process: San José de Kayamá*



*Defining locally appropriate TEK Domains: (Conceptual Knowledge and/or Skills)*

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# Appendix I. Cosmopolitan Domain List

## I. Conceptual Knowledge

### 1. Plant domain

- a. taxonomic names and identifications
- b. cultural use or significance
  - i. edible
  - ii. medicinal
  - iii. construction
  - iv. technological
  - v. fuel
  - vi. commercial
  - vii. ornamental-artistic
  - viii. spiritual-ritual
  - ix. other
- c. characteristics (e.g. morphology, behavioral habits, life cycle traits, habitat)

### 2. Animal domain

- a. taxonomic names and identifications
- b. cultural use or significance
  - i. edible
  - ii. medicinal
  - iii. construction
  - iv. technological
  - v. fuel
  - vi. commercial
  - vii. ornamental-artistic
  - viii. spiritual-ritual
  - ix. other
- c. characteristics (e.g. morphology, behavioral habits, life cycle traits, habitat)

### 3. Plant-Animal Relationships

- a. type of relationship (e.g. food source, shelter, protection, dispersal agent)
- b. effect of relationship (beneficial/harmful/neutral)

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**4. Biotopes/Landscape units**

- a. names
- b. characteristics (e.g. elevation, topography, edaphy, architecture, indicator species, disturbance agents, etc.)
- c. cultural use or significance

**5. Soil domain**

- a. names
- b. characteristics (e.g. color, texture, fertility)
- c. cultural use or significance
- d. crop suitability

**6. Climate domain**

- a. elements (e.g. temperature, precipitation, wind)
- b. seasonal periods and indicators
- c. seasonal activities

**7. Ethnogeography**

- a. place names
- b. location
- c. cultural use or significance

## **II. Practical Skills**

- 1. Primary resource production or procurement
  - a. agriculture
  - b. herding
  - c. hunting
  - d. fishing
  - e. collection
- 2. Food preparation or processing
- 3. Ethnomedical preparations or applications
- 4. Craft and tool making
- 5. Architecture and construction

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# Appendix 2.

## Calculating the VITEK statistics

### (1) Intergenerational Rate of Retention (RG)

The RG indicates the rate of retention between any successive pair of age groups and is calculated as the ratio of the generation mean to that of the generation immediately preceding it. This calculation is given by:

$$RG_t = \bar{g}_t / \bar{g}_r$$

where  $\bar{g}_t$  is the mean score of the target age group (i.e. the younger group of the pair) and  $\bar{g}_r$  is the mean score of the reference age group (i.e. the next ascending group).

The  $RG_t$  of the oldest age group is set at 1 based on the logic that no information about the aptitude level of the preceding generation(s) is available and therefore we cannot assume that any differences or changes have occurred in prior time periods.

### (2) Cumulative Rate of Retention (RC)

The RC reflects the proportion of the baseline aptitude level retained by each succeeding age group. RC is calculated by multiplying the reference RC by 10 raised to the power of the logarithm of the target RG. As with the RG calculation, the RC of the oldest target age group is set at 1. The formula is defined as:

$$RC_t = RC_r \cdot 10^{\log(RG_t)}$$

### (3) Annual Rate of Change (CA)

The CA expresses the average rate and direction of change per year reflected by the target age group and is given by:

$$CA_t = \frac{RC_t - 1}{yg_t}$$

where  $yg_t$  is the length in years of the target age group interval.

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# For More Information

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Full report and other info available for download on site.

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*“Traditional and local knowledge refers to knowledge held by individuals and collectively by communities that may be based on spiritual teachings, personal observation and experience, or passed on from one generation to another through oral and/or written traditions. As a result, it is dynamic, substantive and distinct living knowledge.*

*Traditional and local knowledge may, for example, contribute to the description of the existing physical, biological and human environments, natural cycles, resource distribution and abundance, long and short-term trends, and the use of lands and land and water resources. It may also contribute to project siting and design, identification of issues, the evaluation of potential effects and their significance, the effectiveness of proposed mitigation, cumulative effects and the consideration of follow-up and monitoring programs.*

*Traditional knowledge is rooted in the traditional life of Aboriginal people. Certain issues are firmly grounded in traditional knowledge, such as harvesting, use of lands and resources for traditional purposes, cultural well-being, heritage resources, and others.*

*Although the basis for traditional and local knowledge and science-based knowledge can differ, they may on their own or together, contribute to the understanding of these issues.”*

From “Draft Guidelines for the Preparation of an Environmental Impact Statement”, pursuant to the Canadian Environmental Assessment Act. Canadian Environmental Assessment Agency, January 2012.



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