



XI CONGRESO INTERNACIONAL DE
ETNOBIOLOGÍA

POSTER SESSION

**TEMA 2 PUEBLOS INDIGENAS Y DIALOGO
DE SABERES PARA LA ADAPTACION**

**THEME 2 INDIGENOUS PEOPLES, KNOWLEDGE
DIALOGUE FOR ADAPTATION**

25 al 30 Junio 2008

Cusco, Perú

SESSION 2

ABSTRACTS

OVERVIEW / SINOPSIS.....	3
ABSTRACTS / RESUMENES	4
1. Assessment of vulnerability of forests, alpine pastures and agriculture due to climate change in central Himalaya, India by R. K. Maikhuri	4
2. Deux perspectives pour appréhender les implications du changement climatique : pêcheurs migrants et pêcheurs indigènes au Gabon de Catherine Sabinot	5
3. African diaspora ethnobotany in the Americas: the role of floristic homogenization by Robert Voeks.....	6
4. Nutrient value of some plant species used by tribals during emergencies in Central India by Jain Ashok and Preeti Tiwari	6
5. Sustainable use of natural vegetation in west africa by use of ethnoecological information by Anne Mette Lykke.....	7
6. Traditional management and use of local plant resources in two villages in the northern albanian alps: visual landscapes by Andrea Pieroni	8
7. Unravelling signals. The perceptions of climate fluctuations by forest dwellers by Edmond Dounias.....	8
8. The use of indigenous knowledge in modeling and monitoring climate change and seasonal cycles: case study of the loita maasai of Kenya by Henri Saitabau	9
9. La revalorización de estrategias campesinas y la difusión de prácticas agro ecológicas para el fortalecimiento biocultural en la subcentral waca playa, Cochabamba-Bolivia por Jaime Claros y Antonio Chungara	10
10. Indigenous People and game animal management among the matsigenka of Manu Park, Perú by Glenn H. Shepard Jr	11
11. El calentamiento global, el retroceso glaciar y sus implicancias en las comunidades nativas al este de la provincia de Canchis-Cusco por Cesar Portocarrero Rodriguez.....	12
12. Kikillan Wiñan: People and forests in the Andes by Keely Maxwell	13
13. Percepción local respecto al cambio climático en el Parque Nacional Sajama por Daniela Ulloa.....	14

OVERVIEW / SINOPSIS

ORGANIZING COMMITTEE / COMITÉ ORGANIZADOR:

Johnson Cerda (Co-coordinator)
johnson.cerda@gmail.com

Tony Gross (Co-coordinator)
United Nations University
Institute of Advanced Studies
gross@ias.unu.edu

Rahera Noa
United Nations University
Institute of Advanced Studies
noa@ias.unu.edu

Alejandro Argumedo
Asociación ANDES
alejandro@andes.org.pe

OVERVIEW

This session will explore climate change impacts and implications for indigenous and traditional communities, as well as their unique adaptation strategies, particularly crop adaptation and adaptation to marginal areas and ecosystem boundaries. Session topics will include (i) protecting ecosystem buffers that provide livelihoods, sacred spaces, and pathways for indigenous peoples and local communities; (ii) the role of collective biocultural heritage in maintaining and strengthening the resilience of healthy ecosystems; (iii) building bridges among indigenous peoples, scientists and policy makers to develop adaptation strategies; and, (iv) incorporating biocultural diversity in the international climate change fora.

Moray lies 74 km from the city of Cusco, and between 3,200 and 3,500m above sea level. It is famous for its sunken amphitheater, made up of four circular terraces that appear to disappear into the earth like an artificial crater. The site is thought to have been an Inca agricultural research station designed for experimenting with crops at various altitudes (some of which run down to depths of 100 meters). It is believed that the terraces, built over containing walls filled with fertile earth and watered by complex irrigation systems, enabled the Incas to grow more than 250 plant species. The special characteristics of this sheltered place lead some to think that Moray was the centre that made it possible to develop varieties of corn that were adapted to higher lands, where traditionally only tubers and grains such as quinoa were grown.

SINOPSIS

Esta sesión explorará los impactos del cambio climático y sus implicancias para las comunidades tradicionales e indígenas, al igual que sus estrategias de adaptación, particularmente la adaptación de los productos agrícolas, de áreas marginales y de los límites del ecosistema. Afiches, vídeos y sesiones plenarias serán diseñados para fomentar el diálogo, el establecimiento de redes de investigación y de acción colaborativa entre los investigadores, estudiantes, funcionarios y miembros de las comunidades quienes enfrentan ya las peores consecuencias del calentamiento global. Los temas de la sesión incluirán: (I) Protección de las zonas de amortiguamiento del ecosistema que proporcionan sustento, espacios sagrados y vías de intercambio para los

pueblos indígenas y las comunidades locales; (II) El papel del patrimonio biocultural colectivo en mantener y fortalecer ecosistemas sanos; (III) Establecer puentes entre los pueblos indígenas, científicos y funcionarios para desarrollar estrategias de adaptación; (IV) Incorporación de la diversidad biocultural en los foros internacionales sobre cambio climático. Invitamos a los pueblos indígenas y comunidades locales a presentar estudios de caso en vídeo y otros formatos.

Se ha programado la visita durante un día a los sitios arqueológicos y del proyecto, para mostrar cómo los pueblos indígenas aplicaron en el pasado y sigue aplicando en el presente sus conocimientos tradicionales para crear estrategias de adaptación climática y de disminución del impacto de desastres naturales. Los participantes de la sesión serán responsables de presentar una síntesis de las presentaciones y de la discusión principal en cada sesión concurrente. Un informe introductorio y un vídeo serán presentados durante las sesiones plenarias, y se identificarán representantes de comunidades y de la sesión para estimular la discusión entre participantes.

ABSTRACTS / RESUMENES

1. Assessment of Vulnerability of Forests, Alpine Pastures and Agriculture due to Climate Change in Central Himalaya, India by R. K. Maikhuri, L.S. Rawat, V.S. Negi, P.C. Phondani, A. Bhauguna and N.A. Farooquee

Vulnerability may be defined as the extent to which environmental and economic changes influence the capacity of human and ecological systems to respond to natural and socio-economic shocks. The most vulnerable systems would be the ones that are most exposed to perturbations, have limited capacity of adaptation and are least resilient. Vulnerability of Himalayan mountain ecosystems assumes more importance when one realizes that impacts of global change in mountains will have profound effects not only on hill people but also those in the adjoining plains. In Himalaya, moraines exposed as a result of glacial retreat due to warming will drive alpine species upward but colonization may be constrained by erosion and nutrient limitations. The dominance of tree species such as *Abies*, *Betula* and *Acer* spp. derives from their physiological adaptations to extremely low temperatures. These species with narrow ecological niche may be exterminated if they fail to compete with the new arrivals under warmer regime and / or to expand their ranges. As altitudinal belts differ in topographic and geological attributes influencing species dominance and distribution, landscape scale composition of forests and alpine pastures observed at present is going to be different from future scenario. Low altitude / foot hill forests dominated by *Shorea robusta* are not likely to be as sensitive as higher elevation vegetation because this species can withstand much warmer-humid / dry climates. Alpine / temperate zones are likely to be the most threatened ones because here replacement of oak forests by pine forest (due to warming driven upward progression of biomes) will reduce quality as well as quantity of forest products needed to sustain livelihood.

Agriculture is a minor land use in terms of spatial extent but has significant influence on vulnerability of forests and alpine pastures that supply livestock feed and manure. Agricultural expansion coupled with changes in management practices is widespread. Local crops/cultivars selected to cope up with the uncertainties of monsoon have suffered the greatest loss due to increasing stress on 'maximisation of income'. Cash crops are being grown where climatic conditions are sub-optimal for them. Therefore, to avoid the possibility of agricultural land use aggravating the threats from climate change to forests/alpine pastures, interventions enabling improvement in agricultural production with reduction in pressure on natural ecosystems are needed. Plantation of ecologically compatible and locally valued tree, shrubs and herbs/crops, amelioration of soil stresses through improved traditional technologies and involvement of people in implementation and monitoring can enable restoration/conservation of forest/alpine biodiversity and increase in carbon sequestration together with local socio-economic upliftment.

Climate change impacts are to be looked not in isolation but in conjunction with socio-economic issues within the wider framework of sustainable development. For improving national capacity to respond to potential opportunities and constraints related to climate change, the prime requirement is improving the knowledge on impacts, adaptations and mitigation. This can be achieved through coordinated programmes dealing with : (a) long term ecological research so as to identify impacts of climate change on biodiversity-ecosystem function relationships (b) evaluation of interaction of climate change with other global changes such as land use change and economic globalization (c) exploration of use of biodiversity and associated goods and services for sustainable development.

2. Deux perspectives pour appréhender les implications du changement climatique: pêcheurs migrants et pêcheurs indigènes au Gabon de Catherine Sabinot.

Sur le littoral du Gabon, différentes communautés de pêcheurs, autochtones et migrantes, d'Afrique de l'Ouest et d'Afrique Centrale, cohabitent. Les pratiques de pêche et de cueillette se réalisent en mer et en lagune en utilisant des méthodes « traditionnelles » comme des méthodes plus modernes. La coexistence de ces méthodes fait non seulement la richesse du lieu, mais elle engendre aussi de nombreuses adaptations et innovations, initiées par les locaux ou les migrants, et générées par des facteurs externes ou internes aux communautés présentes. Ainsi, à l'interface entre la terre et la mer, dans un lieu où des populations de diverses origines se côtoient, je peux m'interroger sur la formation des savoirs et savoir-faire, leur fonctionnement, leur transmission, leur érosion, les causes de leur disparition, leur réhabilitation ou restauration potentielle selon des critères techniques et/ou identitaires. Dans la région de la Nyanga au sud du Gabon, où j'ai mené dix mois d'enquête en 2005 et 2006, l'adaptation au changement climatique peut se percevoir à différentes échelles. Localement, le régime des pluies se transforme de plus en plus et les ressources animales disparaissent ou se déplacent. Cela nécessite des adaptations dans la conception des outils, dans la saisonnalité des pratiques, et parfois même génère des changements dans les modalités de transmission des savoirs et savoir-faire locaux. Par ailleurs, en migrant, certaines populations se sont trouvées confrontées à un changement de conditions climatiques par le déplacement d'une zone climatique à une autre (tropicale vers équatoriale). Les Sénégalais ont ainsi dû adapter non seulement leurs activités de pêche, mais aussi leur pratiques de conservation et de transformation de la ressource au nouvel environnement gabonais (régime des pluies, taux d'hygrométrie, ensoleillement, température de l'eau et de l'air, espèces différentes, etc.). Ce terrain de recherche permet alors d'aborder selon deux perspectives le questionnement sur les impacts des changements climatiques et les implications pour les communautés : celle des populations indigènes dans leur milieu changeant, et celle des migrants changeant de milieu. L'analyse conjointe de ces deux points de vue offre diverses pistes de réflexion pour mieux appréhender les processus d'adaptions susceptibles d'être mis en œuvre par des populations se trouvant face au changement climatique, qu'il soit brutal ou progressif.

3. African diaspora ethnobotany in the americas: the role of floristic homogenization by Robert Voeks.

The Columbian encounter initiated a massive floristic reorganization of the coastal Atlantic World. Ringed by highly endemic floras, these anthropogenic poles of habitat disturbance became increasingly homogeneous by the 17th century in terms of naturalized cultigens and weeds. By the peak of the African slave trade, enslaved peoples who were transported to the Caribbean, the Guianas, and Brazil would have encountered a wealth of familiar and useful species—material and spiritual. The botanical continuity provided by these culturally facilitating species, which preceded and accompanied the Black diaspora, encouraged reformulation of traditional ethnobotanical practices in the Americas. This paper examines the significance of pan-Atlantic foods and weeds to the Afro-Brazilian plant pharmacopoeia.

4. Nutrient value of some plant species used by tribals during emergency in Central India by Jain Ashok and Preeti Tiwari.

A good number of tribal communities are inhabiting in forest localities of Central India, a treasure of plant wealth. As per the survey made by Botanical Survey of India, over 2400 species belonging to angiospermic taxa occur in this region. A large number of species in this region have been declared under threat category due to various factors. Tribals have an intricate relationship with plants growing around them. The main tribes of the region are Gond, Bheel, Sahariya, Korku and others. For day to day requirements these tribes are dependent on plants and their parts.

Various tribal localities were surveyed regularly and information on multifarious uses of plants was gathered. Emphasis was laid on plants used during emergency i.e. drought, famine, floods, fire and others. Ten selected species were analysed by standard methods for observing various parameters like, protein, lipid, starch, sugars, magnesium, potassium and sodium.

During the survey it was observed that when edible plants are not sufficiently available, tribals use several other species as supplementary food. Such adverse conditions may occur due to drought, famine, floods, forest fire etc. In present study the ten species which are extensively used during adverse conditions were selected for their nutritional value. These species are: *Oxalis corniculata*, *Rhus parviflora*, *Moringa oliefera*, *Bauhinia vahlii*, *Cassia fistula*, *Cassia obtusifolia*, *Prosopis cineria*, *Boerhaavia diffusa*, *Achyranthus aspera*, *Amaranthus viridis* and *Cynodon dactylon*. These species grow abundantly in this region. Nutritional analysis of various parts of selected species was made with extraction of some contents like sugars, starch, lipids, nitrogen, magnesium, sodium, potassium etc. Higher protein contents were observed in seeds of *Bauhinia vahlii* (24.21%), followed by *Oxalis corniculata* (22.28%), *Moringa oliefera* (22.80%), *Achyranthus aspera* (21.37%) and *Cassia obtusifolia* (20.25%). Starch contents were maximum in seeds of *Achyranthus aspera* (10.9%), followed by seeds of *Bauhinia vahlii* (10.24%), leaves of *Oxalis corniculata* (10.12%), leaves of *Boerhaavia diffusa* (10.24%), and pods of *Prosopis cineria* (9.81%). Other contents were also found to be in good amount in selected species. As per folk-lore claims the consumption of edible dishes of such species supplements the nutrition. Similarly in other parts of the country a large number of species which possess nutritional value, have been observed. Popularization of this information could help the people suffering from mal nutrition.

5. Sustainable use of natural vegetation in West Africa by use of ethnoecological information by Anne Mette Lykke.

One of Africa's major development challenges is to establish a link between global initiatives and new technologies, on one side, and local management actions, on the other side. The SUN project (tools for management and Sustainable Use of Natural vegetation in West Africa – www.sunproject.dk) works to broaden the role of scientists as mediators between the world of scientific information, global conventions and the African realities, where practical actions are wanting.

Ethnoecological information is an important means to obtain information about vegetation changes under a changing climate characterized by less and more variable precipitation than earlier. A highly structured quantitative ethnobotanical method for valuation of local use-preferences and vegetation changes is used and exemplified by studies from the Sahel zone of Burkina Faso and from the Sudan zone of Senegal. The ethnobotanical method gave management-relevant information by identifying a large number of highly important species for local use and at the same time identifying declining species and describing vegetation changes in detail.

It is essential to comprehend vegetation changes and to direct natural resource management towards local needs in order to obtain sustainable use of the vegetation. Management plans and strategies are therefore developed on the basis of ethnoecological information through a collaboration between scientists, local people and local structures (government, NGOs, development projects). As part of the SUN project, scientists simply install themselves in the core areas to interact actively with local

communities until the management plans have been agreed upon by all parts, and following management plans are prepared under their responsibility.

6. Traditional management and use of local plant resources in two villages in the Northern Albanian Alps: visual landscapes by Andrea Pieroni.

This visual presentation will illustrate how two remote communities in the Northern Albanian Alps (Lepushe and Theth) perceive, manage, and use local plant resources. This story will tell of the people who have remained in these places since the fall of the Communist regime in 1991, either because they were so special to them that they did not want to leave, or because they could not find the chance to migrate, either legally or "illegally" to the United States or Western Europe, as most of the other inhabitants of Northern Albania have done. It will tell of how the villagers have managed to provide food and health care for themselves as they continue living in their mountains sustained by their few cows, pigs, potatoes, cabbages and corn, while facing the dramatic collapse of their national economy and their institutionalised health and transport systems. It will tell about their local food, their interactions with their environment, and the gender relations prescribed by these traditional practices. It will also describe the perspective of the author, what he observed, and reflected on.

7. Unravelling signals: the perceptions of climate fluctuations by forest dwellers by Edmond Dounias.

"We are losing our ancestral knowledge because the technicians only believe in modern science and cannot read the sky" (a farmer in the Andes, cited by Salas in Scoones & Thompson 1994).

We need to explore more "ethno-meteorology". In the tropics like elsewhere, seasons are intra-annual fluctuations of climate that are crucial to the survivorship of all life forms. Accordingly, how human societies adjust to these fluctuations is abundantly documented. Inter-annual fluctuations are equally important, but are much less explored as they require repeated observations over a longer period of time. How local peoples deal with abnormal years that happen irregularly and in an unpredictable way remains unexplored. Have communities elaborated strategies to respond to unusual events that happens only a few times during a lifetime (in relation to el Niño/ENSO for instance)?

Tropical humid forests are almost ignored in the international debate on climate change, because changes are much less tangible and their occurrence are much less "spectacular" than in desert or arctic environments. Because the incidence of climate change in tropical forests is subtle and only slightly perceptible, we suggest to deeper investigate into local people's perceptions, on the tight frontier between "feelings" and "objective observation". In the new context of climate change, the capacity of local communities to anticipate on erratic fluctuations of seasons is vital for their livelihoods.

The talk will focus on bio-temporal signals that are determining events upon which forest dwellers have acquired the capacity to anticipate on climate fluctuations, to organize the calendar of their activities and to take their decisions to invest in some activities and not in others. Such indicators are completely neglected by formal land managers or, at best, simply considered as "folklore" and informative only to anthropologists. Even if local interpretations of such "signals" often refer to mystic and symbolic considerations or invoke supernatural forces, the basic ecological observations of the expert eyes of local peoples remains a precious source of information for biologists. Through these thousands of daily observations, local communities can be considered as fantastic observers of the changes occurring at the ground level, observations that are complementary to those of the most sophisticated satellite.

Through this presentation we wish to advocate in favor of a greater involvement of forest peoples into the process of assessing the poorly visible impact of climate change on tropical forests. Through their extensive traditional ecological knowledge and know-how, forest dwellers could play a determining role as "sentinels" by providing first-hand and accurate observations and supplying databases that

dramatically fail at incorporating anthropological data into the elaboration of predictive models on climate change.

8. The use of Indigenous knowledge in modelling and monitoring climate change and seasonal cycles: case study of the loita maasai of Kenya by Henry Saitabau.

The Loita Maasai located in southern Kenya near the border with Tanzania are still intricately interwoven with the environment for their pastoral and cultural existence. This is attested by intimate knowledge of ecology and related aspects acquired since childhood. Loita people have unique ways of interacting, learning and understanding changes within their surrounding environment and be able to use various indicators to monitor and predict local climate through seasonal cycles, hence coming up with preparedness measures to encounter expected effects either positive or negative brought about by climate change. Traditionally, the Loita Maasai observe a variety of environmental indicators which enable them monitor changes in local climate and subsequently predict weather patterns and their impact to their livelihood. This paper explores the type of indigenous knowledge that helps the local people to monitor and predict weather patterns among the Loita Maasai and also looks at how IK can be used in predicting and monitoring climate change. The knowledge can also be used to recommend measures to stem global climate changes and to enable local communities participate in finding sustainable solutions to threats of climate change.

9. La revalorización de estrategias campesinas y la difusión de prácticas agroecológicas para el fortalecimiento biocultural en la subcentral Waca Playa, Cochabamba-Bolivia por Jaime Claros y Antonio Chungara.

Los campesinos de Waca Playa asentados en la región andina de Cochabamba - Bolivia, aprendieron de sus abuelos muchas maneras de prevenir los riesgos climáticos como las granizadas. Sin embargo, estas estrategias campesinas que se manifiestan a través de actos simbólicos y rituales están siendo dejadas de lado por diversos factores, pese a que muchos comunarios reconocen su efectividad como Don Justo Bustamante Coca, de Lambramani, que afirma que sus parcelas “están muy bien protegidas por cruces bendecidas en tres templos”. Otros comunarios indican que existen numerosas maneras de luchar contra las granizadas u otros riesgos climáticos, utilizando por ejemplo q’oas e inciensos (sahumerios), colocando palmas en cruz en las casas, plantando cruces de madera en los orq’os (cerros sagrados) o pukaras (lugares sagrados).

Enmarcados en un enfoque biocultural y de diálogo de saberes, el proyecto comunitario integral de apoyo a la conservación de suelos y agroforestería en la Subcentral Waca Playa, ejecutado por CREM CRIAR en el marco del Programa BioAndes, ha optado por apoyar la revalorización de las estrategias campesinas y la difusión de prácticas agroecológicas, cuyo objetivo es promover el desarrollo endógeno sostenible.

Una de las prácticas que el proyecto apoyó su revalorización, fue las cruces de madera que los comunarios consideran que son las más efectivas para defender a sus cultivos principalmente de la granizada. Se inició con la construcción de las cruces madera pintadas blanco como se hacía antiguamente. Luego se llevo a bendecir a tres templos bajo la conducción de las autoridades comunales. Toda comunidad, compuesta por niños, adultos, ancianos, sean católicos o evangelistas, asistió en romería invocando a la “Pachamama” (Madre Tierra) y pidiendo perdón por todos los actos impuros cometidos. Una vez concluidas las ritualidades y la reconciliación, las cruces fueron plantadas orientando los brazos hacia las campos de cultivo a fin de que sean los protectores a los

efectos devastadores ante todo de las granizadas, y es así como ocurrió en la última campaña agrícola.

Las condiciones de alto riesgo climático en las que desarrollan su producción las comunidades de la Subcentral Waca Playa, obliga en muchos casos a que los comunarios recuperen sus estrategias tradicionales para contrarrestar los fenómenos naturales que perjudican de sobremanera su producción. No obstante, la sostenibilidad de su producción no solo está amenazada por los fenómenos climáticos, sino también por otros aspectos como el crecimiento poblacional, el uso de agroquímicos, entre otros. Por ello, fue fundamental que el proyecto opte también por difundir prácticas agroecológicas como la elaboración de biofertilizantes y biopesticidas, los cuales lograron importantes resultados en la productividad, en el cuidado del medio ambiente y la conservación de la biodiversidad.

Como resultado de nuestra experiencia, consideramos que la integración de las estrategias campesinas y prácticas agroecológicas bajo un enfoque de diálogo intercultural, es el mejor camino para contribuir al desarrollo sostenible de muchas comunidades campesinas de la región andina de Bolivia.

10. Indigenous People and Game Animal Management among the Matsigenka of Manu Park, Peru by Glenn H. Shepard Jr., Douglas W. Yu, Julia Ohl, Taal Levi.

The presence of native people in nature reserves in Amazonia has spawned debate between those who view indigenous people as conservationists, and those who see them as a threat to biodiversity conservation. We examine the polemic from the perspective of a specific and celebrated case: Manu National Park, Peru. Manu Park constitutes the core area of the UNESCO Manu Biosphere Reserve, and has been declared a World Heritage Site. Since its creation, it has been hailed as a “Living Eden” and one of the world’s most important protected areas. However, Manu Park suffers from a fundamental contradiction: the core area, considered untouchable and closed to human interference, is home to a substantial population of Matsigenka and other native groups. Some conservation biologists have argued that the growing Matsigenka population constitutes Manu’s death sentence, through game animal depletion and increasing resource extraction. The counterargument has been that indigenous inhabitants provide a barrier to more immediate incursion threats by commercial resource extractors. In this paper we analyze data from a participatory, interdisciplinary project carried out in collaboration with Matsigenka native communities in Manu Park. Twenty-five trained Matsigenka hunting monitors recorded game offtake over a 30-month period. The first twelve months of data, presented here, amount to 2,089 prey items over 102,397 consumer-days for a total of almost 16 tons of game meat hunted. However, using synchronic and historical comparative data, we find little or no evidence that any game species -- including vulnerable large primate populations -- has become depleted, other than locally, despite a near doubling of the human population over the past 15 years. The current offtake by the Matsigenka appears to be sustainable, apparently due to source-sink dynamics in which animal populations in the core hunting zone (sink) are replenished by migration from vast, un-hunted (source) zones surrounding the communities. Thus the Matsigenka communities pose no immediate threat to biodiversity conservation in Manu Park. Moreover, source-sink dynamics imply that even with continued human population growth in the future, the impact on hunted species will eventually level out for each settlement. Especially given the ongoing paving of the Inter-Oceanic Highway and the imminent waves of migration, resource extraction and deforestation expected within the region, we suggest that conservation biologists and the Manu Park administration work with the Matsigenka communities as conservation partners. Specifically, we propose greater collaboration between the Matsigenka communities and the Park administration towards game animal management and joint park defense activities.

For now, Manu’s large size dwarfs its human inhabitants, likely allowing source-sink dynamics to replenish game populations. An interdisciplinary research project in collaboration with the Matsigenka communities of Manu has (1) estimate the degree to which hunting is or can be made sustainable in the present, (2) project future game catchment area scale-up based on different scenarios of population growth and cultural change, and (3) develop a management plan, in collaboration with the

Matsigenka and other stakeholders, to minimize indigenous-park conflicts and stabilize the environmental impact of current settlements.

In this work, we summarize aspects of human ecology in Manu relevant to conservation issues, present a critical assessment of the anthropological and conservation policies of Manu Park, discuss conflicts and common interests between Park administrators, conservation biologists, and the park's indigenous inhabitants, and reflect upon the future of biodiversity conservation and indigenous cultures of the Amazon.

For now, however, Manu's large size dwarfs its human inhabitants, likely allowing source-sink dynamics to replenish game populations. In fact, highly vulnerable tapirs and large monkey species are still found within a day's walk of the Matsigenka settlements. As a result, the parks versus people debate boils down to a single question, "How long can Manu remain big? And the key challenge therefore is to find a way to make such source-sink dynamics politically and culturally stable, or they will merely represent a temporary reprieve, until population growth and westernization erode non-hunted forests. We are addressing this challenge by putting together a rare collaboration between ecology and anthropology. Secondly that our study will produce one of the best datasets available on game exploitation in the tropics, including a first-of-its-kind map of hunting zones, combined with comprehensive measures of indigenous demography and settlement patterns. Another novel aspect is that our results will be used to develop a comprehensive plan of management. This project's interdisciplinary nature does not find a natural home in standard funding agencies. We believe that such pessimism presents an impoverished view of conservation goals, ecosystem functions, and human adaptability.

11. El calentamiento global, el retroceso glaciar y sus implicancias en las comunidades nativas al este de la provincia de Canchis-Cusco por Cesar Portocarrero Rodriguez.

La Cordillera Vilcanota dentro de las cadenas montañosas nevadas del Perú, es la segunda en extensión en nuestro país y provee del vital recurso a los ríos Vilcanota y San Gabán en la época de estío. Los ríos Salka y Pitumarca en la cuenca del Vilcanota son los que proveen la mayor parte del caudal que lleva nuestro legendario Wilcamayu y el río Corani es el principal afluente del Río San Gabán que lleva la mayor parte del insumo para la generación de energía eléctrica para la Central Hidroeléctrica San Gabán. Por una parte el Salka (salvaje, arisco) y el Corani (denominado de ocho colores) por la diferente erosión que ocasiona durante el año son ríos sumamente importantes para Cusco y Puno. Ambos tienen un origen común que son los hielos de la capa Glaciar Quelccaya integrante de la Cordillera Vilcanota que es la capa glaciar más grande del trópico terrestre ya que contaba a fines de la década de los años 70 con un área de 55 km² y que ahora dado el calentamiento global se ha reducido en un 25 %.

Desde 1976 un equipo de investigación peruano norteamericano ha trabajado conjuntamente en Quelccaya hasta ahora y dentro de los hallazgos se puede mencionar que ha sido el primer lugar en el mundo donde se han hecho perforaciones en hielo a 5700 metros sobre el nivel del mar y establecido la variabilidad climática del altiplano peruano boliviano desde hace 1500 años y se ha conocido frecuencia de los fenómenos el Niño, relación de las grandes sequías con el decaimiento de la cultura Tiahuanaco y el traslado de su población hacia el valle del Vilcanota y del Apurimac y consiguiente fusión con la cultura Wari para formar el Imperio de los Incas. Pero ahora todo ese cúmulo de grandeza que guarda Quelccaya está desapareciendo dolorosa y catastróficamente. Quelccaya al igual que todos los glaciares del mundo se está derritiendo aceleradamente tal como ha ocurrido con el gran Chacaltaya , orgullo de los paceños. Y es que Quelccaya nuestra gran capa glaciar se va reduciendo rápidamente, las grietas señal de su fracturamiento y dinámica llegan casi hasta la cumbre y se va nuestra principal biblioteca de clima en nuestra zona sur del Perú y catastróficamente porque en principio ya produjo en el año 2006 la rotura de la laguna al pie de la lengua glaciar Qori Kalis (ver este nombre en cualquier buscador de Internet y verán la profusa información que hay al respecto). Pero lo más alarmante por una parte es la disminución del aporte hídrico recurso hídrico tanto en la época de estío para los ríos Vilcanota y Corani y la repercusión que

ello tiene para la agricultura, el consumo humano incluyendo la ciudad del Cusco que actualmente capta por bombeo la napa que abastece el Vilcanota cerca de Andahuaylillas y que luego es impulsada hacia nuestra querida capital del Tahuantinsuyo; pero no solamente faltará para el consumo humano y la agricultura sino también para la generación de energía eléctrica que es la más limpia y para otras actividades. Pero por otro lado deseo poner en conocimiento de la opinión pública algo desesperante que vimos en Junio del 2007 en Quelccaya y se trata de que el retroceso glaciar está originando el desvío de las corrientes de agua de una quebrada hacia otra, lo cual en este momento están viviendo las comunidades nativas al sur este de Pinaya-Santa Bárbara-Sicuani, en donde se ve claramente que una de las quebradas o valles alto andinos se está secando, sus bofedales que permiten el crecimiento del pasto para las alpacas se están secando con grave perjuicio de la sobrevivencia de las familias que habitan en esa alejada y remota área de la provincia de Canchis. Este problema no solamente originará la mayor pobreza y hambruna de la población aledaña sino conflictos por el recurso hídrico de incalculables dimensiones si es que no se busca desde ahora proveer a esta gente de agua ya que su fuente original se ha perdido y ellos buscarán trasvases de quebradas aledañas, proceso en el cual tienen que participen las autoridades relacionadas con el agua para dar soluciones justas y equitativas.

12. Kikillan Wiñan: People and Forests in the Andes by Keely Maxwell

The relationship of indigenous people to forests has been extensively analyzed in Amazonia. Ethnobiologists have documented indigenous people's use of forest products and the anthropogenic nature of forest ecosystems. Discussions of biocultural heritage in the Andes, however, tend to focus exclusively on agricultural biodiversity. There is a significant gap in understanding how montane forests comprise part of Andean cultural landscapes. Given the potential of global climate change to significantly alter montane forest structure and composition, it is imperative that more attention be paid to people-forest relations in the Andes. Doing so will provide a first step in helping design projects to mitigate the impacts of climate change on Andean livelihoods and forest ecosystems. I draw upon extensive ecological and ethnographic fieldwork in the Cusichaca Valley of Peru to analyze people-forest relations in the Andes. First, I explain how Andean rural villagers use forest resources for fuelwood, construction, and medicine. Fuelwood, for example, continues to be a primary cooking energy source in many rural Andean households, yet species preferences and collection strategies have been largely uninvestigated until now. Access to forest resources involves both individual and collective rights. Second, I explore the anthropogenic and biophysical forces that shape forest ecosystems in the Andes. Much discussion of Andean forest ecosystems has concentrated on how people reduce forest cover by actions such as livestock grazing and pasture fires. Forests thus become perceived as natural ecosystems, with montane grasslands the unnatural ecosystems produced by human activity. This distinction obscures the role of natural disturbances in shaping forest cover patterns. It also obscures the role of people in shaping forest structure and composition. My analysis of vegetation structure and composition in Andean forest stands illustrates the myriad forces that affect forest ecosystems. Understanding what forces influence forest ecosystems today is important to understanding how climate change may impact Andean forests. Third, I discuss Andean approaches to forest management. Residents of the Cusichaca Valley distinguish natural forests (monte) from trees planted around agricultural fields or in plantations. Rural villagers plant primarily exotic species such as eucalyptus, peach, and capulí. One means by which villagers categorize native species is that a native tree "grows by itself" (kikillan wiñan). As such, villagers rarely plant native trees. In this case, traditional knowledge involves a lack of knowledge of planting techniques. In the future, it will likely be necessary to plant native species to ensure continued forest reproduction in the face of climate change. Obstacles to success may include a lack of knowledge of propagation techniques, land tenure insecurities, tense state-campesino relations, and a history of planting programs that focus on exotic species and try to maximize the number of trees planted, rather than planting species appropriate to local ecological and social systems. This paper broadens the

discussion of how to mitigate climate change impacts on Andean livelihoods and cultural landscapes by adding forests to the discourse.

13. Percepción local respecto al cambio climático en el Parque Nacional Sajama por Daniela Ulloa, Karina Yager, Prem Jai Vidaurre.

El Parque Nacional Sajama (PNS), área protegida de Bolivia ubicada en la Puna del departamento de Oruro, cuenta con una superficie de 95.000 hectáreas de las cuales el 83% son destinadas a la ganadería y el 17% son sallas (nevados o rocas sin vegetación). En los últimos años comunarios de esta región expresaron una gran preocupación respecto a los inesperados cambios que el clima presentó, a la aparente disminución de su glaciar, el nevado Sajama, y a la mortalidad del ganado incidiendo en su actividad económica. En respuesta a esta inquietud instituciones como CI (Conservación Internacional), HNB (Herbario Nacional del Bolivia), IE (Instituto de Ecología), SERNAP (Servicio Nacional de Áreas Protegidas), PNS (Parque Nacional Sajama) y PNCC (Programa Nacional de Cambios Climáticos) organizaron un taller dentro del cual se identificaron las percepciones locales respecto al cambio climático en un diálogo mutuo entre científicos y comunidades. Se contó con la participación de comunarios de las cinco localidades del PNS: Sajama, Caripe, Lagunas, Manasaya y Papel pampa.

La metodología diseñada para la identificación de percepción local sobre el cambio climático estuvo compuesta por dinámicas participativas (Cambios integrales en los últimos 50 años, La línea del tiempo y Nuestro Nevado) que permitieron a los participantes, en un ambiente de interacciones horizontales, expresar, individual y grupalmente, determinados ejes temáticos con respecto al clima y su experiencia con los cambios. La información obtenida por medio de las dinámicas pudo ser sistematizada en los siguientes tópicos: 1. Percepción sobre los cambios integrales en los últimos 50 años.- Los miembros del taller trabajaron grupalmente y determinaron cambios sustanciales en los siguientes aspectos: el clima de ahora en comparación con el de su niñez, lluvia y sequía, inundaciones, bofedales, animales, plantas, viento, nieve, sol y estaciones del año. 2. La línea del tiempo.- Se estructuró un cuadro en el cual se observa esquemáticamente los hitos climáticos que más los impactaron durante los últimos 50 años. 3. Nuestro Nevado.- Los participantes construyeron maquetas con el paisaje de su comunidad abriendo la discusión a una percepción espacial (cartografía, mapa parlante) y temporal (el trabajo con mapas a 10 años de intervalo) de los cambios en la región. Facilitó la concientización de los comunarios a temas de variabilidad en las percepciones de los distintos participantes, y relaciones entre habitantes y comunas (ej. competición por agua y por bofedales para ganadería).

En ese sentido las dinámicas lograron: Ser un primer espacio de discusión sobre el cambio climático; Reconocer que el cambio climático es una preocupación comunal y su influencia en la vida cotidiana; Reconocer que existen efectos interrelacionados (como la reducción de áreas de pastoreo por el cambio en la precipitación pluvial vinculado también al sobrepastoreo y manejo del ganado) y que deben ser manejados de forma integral; Determinar que los cambios en la época e intensidad de la lluvia; Al identificar y reconocer sus propias experiencias se viabilizó la determinación de medidas de adaptación.