ABSTRACT

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The impacts of colonization and modernization have undermined and neglected local or indigenous knowledge - not only in current day developing countries but also for select communities in industrialized or developed countries.   Over the last decade, however, there has been an increased international interest to revitalize and restore indigenous knowledge. Multilateral development organizations, local and global NGOs, policymakers, education institutions and the private sector, such as pharmaceutical industries, are among the institutions that have shown interest in indigenous knowledge.

For instance, indigenous knowledge has shown to be of great importance in health and development practices. In Southern Africa, the Commercial Products from the Wild (CPWild) project estimates the value of informal herbal remedies in the market to be between $75 million to $150 million per year. Over 1000 indigenous crops and medicinal plants are traded in this informal market system and more than 100,000 people are income earners in this industry.

The international interest shown by these institutions, however, has led to numerous challenges for indigenous knowledge at the global level and sparked many debates around the nature of indigenous knowledge, who the indigenous knowledge

holders are, and whether indigenous knowledge is scientifically valid or applicable in conventional knowledge paradigms.

Therefore, this research study investigates the representation of indigenous knowledge in globally operating institutions in the United States. Using a qualitative research lens, the challenges and issues listed above are examined in three cases studies – the World Bank, the National Institutes of Health, and Pennsylvania State University – all of which house initiatives on indigenous knowledge. In each case study, the definition of "indigenous," nomenclature used to label indigenous knowledge, indigenous knowledge identification, and institutional processes were studied to understand how indigenous knowledge was represented alongside conventional knowledge.

The findings reinforce the challenges presented in the literature and previous research done in indigenous knowledge. Suggestions for each case study include changing the nomenclature used to label indigenous knowledge and changing the institutional processes involved in identifying and embedding indigenous knowledge into their respective institutional frameworks.

**INDIGENOUS KNOWLEDGE INITIATIVES AT THE
WORLD BANK, THE NATIONAL INSTITUTES OF HEALTH, AND
PENNSYLVANIA STATE UNIVERSITY**

By

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I. Introduction and background

The impacts of colonization and modernization, not only on current day developing countries, but also on select communities in industrialized or developed countries[1] has undermined and neglected their indigenous knowledge. Indigenous knowledge can be defined as knowledge existing outside conventional knowledge or non-formalized knowledge of marginalized, rural, or poor local communities or people. During periods of colonization and modernization, indigenous knowledge was viewed as unscientific and as less valuable than colonizer's knowledge, Westerner's knowledge,[2] or modern knowledge[3] - I refer to all as conventional knowledge[4] - because they were associated with cultures seen as primitive and perhaps less technologically or scientifically advanced (Semali and Kincheloe, 1999 and Dei, Hall, and Rosenberg, 2000).

In the process of colonization, unfortunately, some indigenous knowledge was also "lost." For example in India, Naik (1972) writes that the British established their own education system and ignored India's culture, religions, and languages.[5] Similar impacts from colonization were seen in countries of Africa where British and French colonizers neglected the respective communities existing systems of education (White,

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[1] For example, Native Americans in Northern America.
[2] Knowledge of European origin
[3] Modern knowledge is generally knowledge codified by Western or American and European scientific institutions (Lachenmann, 1994). In addition, modern knowledge can also be understood as knowledge imported into a region or knowledge that is not local to the region of study (Evers, 2003).
[4] In my research, conventional knowledge means knowledge imposed from colonization and modernization, and includes knowledge of European origin, colonizer's knowledge, or Western knowledge.
[5] Sangwan (1990) suggests that the British also contributed to the destruction of Indian culture through their science education. He mentions that in previous lending of science education, for instance when Muslim rulers came to India, the Muslims embraced Indian culture by preserving India's literature and past. At the same time the Muslims introduced Indians to concepts in science that they could incorporate with their knowledge.

1996). Moumouni (1964) writes that traditional methods of education such as "games and story-telling" (Moumouni, 1964 in White, 1996) were not considered as education by the colonizers and hence destroyed when the colonizers established their methods of education and knowledge. The loss of this knowledge in colonized countries can be attributed to the colonizers conventional ideals of science, such as written documentation (as opposed to oral traditions), validation through their scientific paradigms, and standardization of knowledge so that it is universally applicable (Shiva, 2000 and Agrawal, 2002).

Despite colonized countries receiving independence from their colonizers, indigenous knowledge continued to be undermined during the development era. The development era for many countries[6] is "intimately" associated to the time after colonization because countries that had just received independence were working to build their nations economically and politically, and build relationships with other countries (McMichael, 1996). The development theory, modernization, which was developed around this time, plays a significant role in the oppression of indigenous knowledge because one of its main tenets is the elimination of traditional values (or indigenous knowledge) for modern values (Fagerlind and Saha, 1989 and So, 1990). Indigenous knowledge scholars, therefore, mainly write from a postcolonial[7] or postmodern[8] perspective since colonization and modernization periods have had the most detrimental impact on indigenous knowledge.

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[6] Period after countries received independence from their colonizers. For most countries this was after 1945.

[7] A postcolonial perspective suggests that colonization destroyed local history, traditions, and cultures and created inequalities in relations and power. See Dei, Hall, and Rosenberg (2000) for a further discussion on postcolonial perspectives.

[8] In my research, I use postmodern discourse to understand how modernization impacted indigenous knowledge. The modernization theory suggests exchanging traditional ways of life for modern ways of life (So 1990). Traditional ways of life can be equated to the practice of indigenous knowledge.

Over the last decade, however, there has been increased international interest to revitalize and restore indigenous knowledge.[9] Multilateral development organizations, local and global NGOs, policymakers, education institutions and the private sector, such as pharmaceutical industries, are among some institutions that have shown interest in indigenous knowledge. The interest may be an attempt to expand existing conventional knowledge and include alternative approaches in development, medicine, education and other areas. In the field of development, for example, there is an interest to identify and apply culturally appropriate knowledge to development practices. For some countries in Africa such efforts are leading to more culturally sensitive development plans (Dei, 2000) to better serve individual country's needs. In addition, the revitalization and restoration of this knowledge can make it globally available for policy makers or practitioners to access and inform global policies and programs.

The literature in this field highlights the valuable opportunities for indigenous knowledge under these recent global initiatives (Warren, 1997; Semali and Kincheloe, 1999; and Gorjestani, 2005). At the same time, however, the literature points to various challenges that this knowledge faces at a global level (Agrawal, 1995, 2002; Briggs and Sharp, 2004; Bricker and Sillitoe, 2004; and Srikantaiah and Rueger, 2008). Therefore, the interest shown by the international community has also sparked many debates about what is indigenous knowledge and who are these knowledge holders. In addition, it has raised questions on the scientific validity of indigenous knowledge and it's applicability or transferability to conventional knowledge.

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[9] This is not necessary a novel idea. Many scholars and practitioners have argued for years that these fields need to challenge conventional knowledge. The discussion of indigenous knowledge simply addresses this issue in a new framework. For example, see Brokensha (1980); Warren (1991, 1992); Long (1992); Sillitoe (1998); and Chambers (1997).

My interest, hence, in studying indigenous knowledge stems from these debates and my work experience in the field. In the following sections I detail the purpose and significance of the study, my research question, and the problem statement.

A. Purpose and significance of the study

The purpose of this study is to understand the opportunities and challenges for indigenous knowledge in globally operating institutions located in the "Western" hemisphere. My interest to study globally operating institutions in the "Western" hemisphere is dominated by my work experience at the World Bank. I worked as an intern with their Indigenous Knowledge for Development Program and saw that despite the awareness brought to indigenous knowledge, it was often marginalized and devalued to "voodoo" or "witchcraft" by staff outside of the program. After I ended my internship, I wanted to know whether other organizations (with similar goals and programs on indigenous knowledge) located in the Western hemisphere faced similar issues.

The organizations I have chosen to study – the World Bank, the National Institutes of Health, and Pennsylvania State University – have similar settings and missions (i.e. located in the Western hemisphere and are international organizations); however, each organization's focus on indigenous knowledge is different. The three areas of focus include: education, health science research, and development. Below I explain the significance of studying these three areas.

Evers and Gerke (2005) write that education, research, and development are important in the production and circulation of knowledge – including indigenous knowledge. The three areas, therefore, are also responsible for introducing, teaching,

validating, or institutionalizing indigenous knowledge so that they can be used in juxtaposition to or as alternatives to conventional knowledge. The intersections between these three areas are significant and their interconnectedness is vital for the survival, expansion, and the appropriate integration of indigenous knowledge with conventional knowledge.

For example, the research that is done in health sciences can provide empirical research, which can be linked to disciplines such as biology, chemistry, or the physical sciences at the tertiary education level. Students graduating from these disciplines may be more willing to integrate either their or other community member's "local-level understanding and perceptions of problems, and local strategies to problem solving" (Dei, Hall, and Rosenberg, 2000 pg. 83)[10] or indigenous knowledge.

Much other cooperation exists between health science research, development, and education. Programs within development organizations that influence policy decisions or development practices in health can use research on the scientific validation and standardization processes of indigenous knowledge. For example, the World Bank's Indigenous Knowledge for Development Program worked closely with the Global Research Alliance, an international organization collaborating with numerous governments, to validate indigenous knowledge and achieve the Millennium Development Goals (MDGs).[11] Their collaborative work has shown that indigenous knowledge can be cost-effective and offer sustainable solutions to development problems

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[10] I define a community to be synonymous to a community of practice who share similar practices, interests, and goals (Davenport and Prusak 1998), for their community's livelihood or survival.
[11] See http://www.undp.org/mdg/ for a listing of the MDGs, which include providing primary education for all children, and basic health and prevention against deadly diseases such as HIV/AIDS and Malaria. These are a total of eight MDGs. (Last accessed on February 21, 2008).

in health, agriculture, and food security.[12] Their findings also allow local governments to better lobby for their indigenous knowledge; especially when local governments are receiving aid or funding from multilateral institutions or other donor agencies.

The benefits of this study are numerous. For centuries, indigenous knowledge has been marginalized in the process of development planning and modernization; therefore, unveiling the opportunities and challenges indigenous knowledge have in the fields of education, health sciences, and development, can help propel related programs and projects so that this knowledge is better integrated with conventional knowledge.

B. Research question

In this study, I will research three case studies each representing the area of education, health sciences research, or development: Division of Natural Products (at the National Institutes of Health), The Indigenous Knowledge for Development Program (at the World Bank), and the Interinstitutional Consortium for Indigenous Knowledge (at Pennsylvania State University). All three cases are located in the United States and operate globally (meaning their work is international). Therefore, studying these organizations will help me answer my research question: how is indigenous knowledge represented in globally operating institutions in the Western hemisphere in the fields of education, health sciences research, and development?

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[12] See Global Research Alliance at http://www.research-alliance.net/. (Last accessed on February 21, 2008).

C. Problem statement

The interest or opportunities, education, health sciences research, and international development, have created for indigenous knowledge and their advocacy work cannot be sugar coated, and in fact, is often controversial. For example, there are many debates and discussions surrounding the scientific validation processes used to validate indigenous knowledge and on the scientisation[13] of indigenous knowledge into databases or other methods of institutionalization[14] (Awang, 2000; Shiva, 2000; and Agrawal, 2002). Further understanding the challenges can help to enhance the opportunities for indigenous knowledge and so that they are recognized and appropriately used in the areas of education, health sciences research, and development.

Based on the literature and my work experience in this area, there are three key challenges indigenous knowledge faces when institutionalized in the West: they are misrepresented and their terminology and definitions are misunderstood; their scientific validity is questioned; and hierarchies in power are displayed. These challenges were investigated in the three case studies.

Misrepresentation: The term indigenous and who the indigenous are is heavily debated in literature and practice (Dean and Levi, 2003; Niezen, 2003; and Hughes, 2003). Some scholars argue that the definition of indigenous peoples or communities should be challenged because there are many communities around the world who have characteristics of indigenous peoples or communities, but are not labeled as indigenous or

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[13] Scientisation is word commonly used in the field of political science to describe the identification, validation, and integration of indigenous knowledge into existing conventional knowledge (Agrawal 2002).
[14] Processes involved in institutionalization include gathering, validating, and embedding indigenous knowledge in an organization's structure.

recognized for indigenous rights (Nathani-Wane, 2000; Niezen, 2003; Semali and Kincheloe, 1999; and Dei, Hall, and Rosenberg, 2000). In practice, however, indigenous knowledge is still commonly associated as knowledge held by indigenous peoples or communities. For example, Srikantaiah and Rueger (2008) suggest that this is the common understanding by staff at the World Bank, therefore, the discussion of indigenous knowledge outside of indigenous peoples or communities is difficult to promote in the institution.

In addition, the terms "local" and "traditional" are frequently interchangeably used with indigenous. In theory, however, these terms can have different meanings and reference knowledge that is not considered as indigenous. Furthermore, in practice, the plurality of terms used to describe indigenous can result in misconceptions on what knowledge should be used in policies or programs and what should be advocated for at a global level. Therefore, it is necessary to create appropriate nomenclature to address the knowledge of interest. It is also necessary to clarify what indigenous knowledge is and to whom it belongs.

Scientific validation: Indigenous knowledge is marginalized as their scientific paradigms do not align with the Western scientific method. In addition, there are many philosophical and cultural differences between conventional and indigenous knowledge. Therefore, indigenous knowledge often takes a back seat as a "solution" to problems seen in health or agriculture and may only be referred to upon as a final alternative. This may in part be due to the scientific validation procedures used. Yuan and Lin (2000) and Shankar and Venkatasubramanian (2005) note that there exist more appropriate and

culturally relevant validation procedures for indigenous knowledge and that these need to further researched and documented.

Therefore, it is important to further understand the different approaches used in scientific validation and see how this research may better inform global policies for their use of indigenous knowledge.

Global and local power issues: At the global level, the institutionalization of indigenous knowledge causes the knowledge to become decontextualized.[15]   The decontextualization of indigenous knowledge means it is taken out of its local context, disconnecting it from processes and factors used in its environment, and is often stripped down to generalizable knowledge or applications. For example, indigenous knowledge can be reduced to a molecular compound without retaining rituals or other medicines used alongside it for its maximum effectiveness. Therefore, organizations can have insufficient methodology in capturing and institutionalizing indigenous knowledge and this works against the characteristics of this knowledge (Wangoola, 2000; Agrawal, 2002; and Briggs and Sharp, 2004) and takes away from their original meaning or function. In turn this may lead to indigenous knowledge being misinterpreted or misused in policies or programs.

In addition, processes involved in the institutionalization of indigenous knowledge can show favoritism towards certain knowledge over others and can be seen as simply "marketing" an indigenous knowledge globally.[16] This can be disadvantageous because some indigenous knowledge will be recognized or valued over others.

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[15] This process is also called as "ex situ conservation" by Agrawal (1995) because it takes indigenous knowledge out of its local environments.

[16] For example, the Hoodia plant from South Africa is marketed as a diet pill.

Furthermore, global institutions may have the upper hand in gaining intellectual property rights for indigenous knowledge not yet "discovered" by the West.[17]   Therefore, at the global level, it is important to note how indigenous knowledge is selected, labeled, and institutionalized.

At the local level, differences in power are significant to note in the study of indigenous knowledge. For example, within local communities some members of the community may have greater authority over their community's indigenous knowledge (Sillitoe, 2002).   Gender, age, and other ethnicities are important to note within communities as they dictate who holds or has greater power of certain aspects of their indigenous knowledge. Therefore, it is important to note the role of local power as it plays in the information local communities decide to share with global policies or programs.

In summary, power issues at a global level and within communities of indigenous knowledge holders are important to note as it can influence what knowledge is presented globally as indigenous knowledge.

In the next section, I have conduct a literature review to define indigenous knowledge and understand the role of indigenous knowledge in the fields of education, health sciences research, and development. The literature review mainly focuses on the interaction of indigenous knowledge with conventional knowledge or their association in globally operating programs.[18]

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[17] For example, the basmati rice was genetically sequenced by Western scientists and patented. No credit was given to the Indian farmers who over many centuries developed this species of rice.

[18] I acknowledge that I am leaving out some literature in field of indigenous knowledge and focus on the interaction of indigenous knowledge with conventional knowledge. I do this in part to focus my literature on my research interests – which are to study indigenous knowledge in the Western hemisphere or globally operating programs. However I do reference and draw on some resources and models of indigenous knowledge outside their interaction with conventional knowledge.

II. Literature review

In part 1 of this literature review, I deconstruct the term indigenous knowledge to understand how scholars in the field define indigenous knowledge. In part 2, I investigate the use and role of indigenous knowledge in the fields of education, health sciences, and development.

Part 1: Definition of indigenous knowledge

A. Indigenous

The term indigenous is sometimes referred to as a historical object of colonial encounter and observations that were made at the time of colonization, therefore, adjectives such as tribal, native, aboriginal, and Indian (Carnerio da Cunha and Almeila, 2000) and primitive (Niezen, 2003)[19] are also associated with indigenous. Use of the term indigenous became preferred, over the other terms listed above, during the post-colonial period, after 1945, and currently is used to describe some minority groups who have survived colonization (Brownlie, 1992) and their knowledge (Niezen, 2003).

It is however important to note for which minority groups this term applies. As will be further shown, many minority groups who can be defined to have indigenous knowledge are not labeled as indigenous. These groups are left out of discussions on who is indigenous and not granted the rights associated with the term. The next two sections detail who are the indigenous and who has indigenous knowledge.

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[19] Niezen (2003) writes that in 1957, when the International Labor Organization (ILO) was creating policies for the protection of indigenous peoples, scholars in anthropology still referred to the local people in developing areas as "primitives."

B. Indigenous peoples or communities[20]

Who the indigenous are is heavily debated and challenged in literature and practice (Dean and Levi, 2003; Niezen, 2003; and Hughes, 2003). Most scholars and practitioners, however, agree that the "indigenous" are people who have lived for generations in a geographic area and have created their community based on their local conditions (Niezen, 2003; Dean and Levi, 2003; and Dei, Hall, and Rosenberg, 2000). The International Working Group for Indigenous Affairs (IWGIA) elaborates further in their definition that the indigenous are, "the disadvantaged descendants of those peoples that inhabited a territory prior to the formation of a state" (Hughes, 2003).

International organizations more closely follow IWGIA's definition in their work programs. The International Labor Organization (ILO),[21] the United Nations (UN),[22] and the World Bank[23] also use the above definition in their work programs with indigenous peoples. The World Bank further recognizes that because indigenous peoples live in various contexts, there may not be a universally accepted definition for indigenous peoples. Therefore, the World Bank also recognizes minority groups governments have labeled as "indigenous ethnic minorities," "aboriginals," "hill tribes,"[24] "minority

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[20] Descrptions of who are the indigenous are framed either as peoples or communities of people.

[21] A central element of the ILO definition is the right to self definition. See www.ilo.org. (Last accessed on February 21, 2008).

[22] The United Nations defines indigenous people as the first decedents in an area and whose cultures are not equally represented or recognized by their respective states. The United Nations estimates that there are 300 million Indigenous Peoples. See www.un.org. (Last accessed on February 21, 2008).

[23] The World Bank has special grants for indigenous peoples or groups and has strict definitions regarding who is eligible for these grants – such as being acknowledged as an indigenous community in their respective country. See http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTSOCIALDEVELOPMENT/EXTINDPEOPLE/0,,contentMDK:20437789~hlPK:1634623~menuPK:935790~pagePK:148956~piPK:216618~theSitePK:407802,00.html: (Last accessed on February 21, 2008).

[24] Unfortunately, tribal people or nomads cannot claim to be the original descendents in an area and therefore may not receive the rights given to indigenous peoples (Hughes, 2003).

nationalities," "scheduled tribes," or "tribal groups," to be indigenous communities or peoples.[25],[26]

The definitions set by these scholars or the ILO, UN, and the World Bank do not carry much power since governments determine and identify indigenous groups in their respective countries (Hughes, 2003 and Srikantaiah and Rueger, 2008).[27] For example, Murumbi (1994) writes that all black people from Africa can claim to be rooted to their continent, and therefore, all black people can be indigenous to Africa. Another prominent example is the government of Botswana's lack of participation in the UN-declared year of Indigenous Peoples (held in 1993) because the government also claims that everyone in their country is indigenous (Lee, 2003).

If governments do not recognize the diversity of their population it can lead to "cultural homogeneity" (Neizen, 2003 pg. 19) and citizens can be considered of equal socioeconomic conditions and welfare. For example, Botswana has a diverse population, and hosts numerous languages, religions, and importantly there are differences seen in socioeconomic conditions in its populations.

Governments in countries of Latin America, on the other hand, identify many indigenous communities in their respective countries. Lee (2003) agrees, on this and writes that Latin Americans have had many scholarly and political discourses on who are the indigenous in their continent and Maybury-Lewis (2003) adds that countries such as, Mexico, Ecuador, and Bolivia have identified themselves as countries with

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[25] See:
http://wbln0018.worldbank.org/Institutional/Manuals/OpManual.nsf/B52929624EB2A3538525672E00775
F66/0F7D6F3F04DD70398525672C007D08ED?OpenDocument. (Last accessed on April 28, 2007).
[26] Hughes (2003) writes that the World Bank does this mainly to, "makes sure [these groups] are not harmed by Bank-funded projects that affect their territories and communities" (Hughes, 2003 pg. 17).
[27] Hughes (2003) notes that this is why the global indigenous movement is, "calling for self-identification to be the main criterion for identifying indigenous peoples" (Hughes, 2003 pg. 17).

"pluriethnic"[28] communities. Mexico, for example, recognizes the indigenity of parts of its population and identifies 56 indigenous groups in their country (Lewis, 2005).[29]

Since there is no clear definition on who indigenous are, scholars suggest that an alternative framework for recognizing indigenous knowledge, outside of indigenous communities,[30] should be developed (Nathani-Wane, 2000; Niezen, 2003; Semali and Kincheloe, 1999; Dei, Hall, and Rosenberg, 2000; and The World Bank's Indigenous Knowledge Program).

As will be seen in the following section, the framework has a boarder focus and describes indigenous knowledge as knowledge that has been marginalized by colonization or modernization.

C. Indigenous knowledge[31]

As presented briefly in the previous section, many scholars in the field of indigenous knowledge suggest that associating indigenous solely with indigenous peoples is limiting. They note that many other communities around the world have indigenous knowledge because they have the same characteristics, which are used to define indigenous peoples. In section *i*, I present the definition of indigenous knowledge according to these scholars and their rationale that indigenous knowledge exists outside indigenous communities.

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[28] Having more than one ethnicity.

[29] Patrinos and Garcia-Moreno (2006) note that in Mexico three variables, language spoken, self-perception, and geographic concentration are used to identify indigenous peoples.

[30] In my research I prefer to use the phrase "knowledge holders" to refer to the people holding indigenous knowledge.

[31] The acronym "IK" is commonly used for indigenous knowledge in research and development. However, I prefer not to use the acronym. Using the acronym IK loses the dynamic character of indigenous knowledge and standardizes it (Srikantaiah and Rueger, 2008).

In addition, in reviewing the literature, the discussion of indigenous knowledge outside of indigenous peoples is also problematic. I cite two reasons for this. One the definition of indigenous knowledge fails to address the hierarchies of knowledge within the label of indigenous knowledge (discussed in section *ii*). Two, the term indigenous knowledge is interchangeably used with local and traditional. Local and traditional knowledge, however, can have different associations.

1. Indigenous knowledge re-defined

A majority of definitions developed for indigenous knowledge reflect knowledge that is primarily associated with indigenous peoples. As discussed earlier, a common definition for indigenous peoples is a group of people who have a "sense of rootedness in a place" (Lee, 2003 pg. 84). However there are numerous communities around the world who have long-term connections to a particular area and are not labeled as "indigenous." For example, the Baiga community, a tribal community in central India, who are not labeled as indigenous, have expansive knowledge of plant classification and their medicinal properties (Sarangapani, 2003). The Baiga community has used this knowledge for generations for their survival and livelihoods and therefore prefers to maintain this type of lifestyle.[32] In fact, there were recent attempts, through a national government funded program, to establish a formal school system in the Baiga community. The initiative failed because the Baiga community's knowledge, most of which is transmitted orally from generation to generation, resisted the content in the curriculum provided by the government (Sarangapani, 2003).

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[32] Similar to the medicinal plants in the Baiga community, the *moringa* plant is used as a vitamin A and C supplement in most tropical countries such as Malawi, Africa, Tamil Nadu, India, and the Caribbean Islands. This plant has survived pressures and influences from colonization in three different regions.

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Another example is the Zuni community in New Mexico, whose indigenous agricultural techniques for land degradation have been used for centuries and are linked to conventional scientific concepts in agroecology and ethnoscience (Norton, Pawluk, and Sandor, 1998). The Zuni community, "offer truly alternative views of ecology and agriculture that stem from long-term use and conservation of natural resources" (Norton, Pawluk, and Sandor, 1998 pg. 333).

Although indigenous knowledge exists outside of indigenous communities and peoples, and can be considered a broader term to describe community members' knowledge, literature does indicate that indigenous knowledge has culturally bound and set characteristics. Scholars, such as Nathani-Wane (2000), Niezen (2003), Semali and Kincheloe (1999), and Dei, Hall, and Rosenberg (2000), who acknowledge that indigenous knowledge does not only pertain to indigenous communities, generally use these characteristics in their definitions of indigenous knowledge: (a) marginalized knowledge or knowledge that is held by disadvantaged communities (Semali and Kincheloe, 1999 and Dei, Hall, and Rosenberg, 2000); (b) knowledge that may be undocumented or orally passed from generation to generation by elders in a community (Ogawa, 1995; Semali and Kincheloe, 1999; and Dei, Hall, and Rosenberg, 2000); (c) knowledge that is generally not learned in formal education systems or knowledge that is not circulated in university settings (Sillitoe, 2002); (d) knowledge that has maintained its originality despite historical wars, imperialism, colonization, and modernization events (Fischer, 2004); and (e) knowledge which includes cultural perspectives, beliefs, such as superstitions, and experiences of social and natural environments (Snively and Corsiglia, 2001 and Kawagley, 1998).

Therefore, as a synthesis of these definitions, indigenous knowledge can be defined as: knowledge existing outside conventional knowledge or non-formalized knowledge of marginalized, rural, or poor local communities or peoples.

2. Hierarchies of knowledge within indigenous knowledge

Based on the definitions provided for indigenous knowledge, it seems that scholars and practitioners have defined indigenous knowledge to be inclusive of all oppressed or marginalized knowledge. The category of marginalized knowledge, however, is itself very diverse. These definitions of indigenous knowledge therefore, fail to address hierarchies or indigenous social structures. Certain forms of indigenous knowledge, although also having been oppressed by colonization or modernization, are dominant and may undermine lower class members of a society.

For example, the indigenous medical system, Ayurveda, which is heavily discussed by Shroff (2000) and Mahindapala (2003), is considered to be an indigenous knowledge system because it was oppressed during British colonization. Although this medical system is designed to help all members of a society, the founders of Ayurveda are from the Brahmin class[33] in the Hindu religion (Neddermeyer, 2006) and Ayurvedic doctors are also generally Brahmin. Therefore, knowledge and practice of Ayurveda remains with the Brahmin class. This is similar to conventional medical systems where medical research and funding generally shows the interest of members from the "dominant class, gender, and racial backgrounds" (Rosenberg, 2000 pg. 143). Lower caste groups of the Hindu religion do not have equal participation in the practice of this medical system.

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[33] Brahmins are the highest caste in the Hindu religion and are known as the "scholars" in Hindu society because they were literate in the ancient language Sanskrit (the first written language in India).

Therefore, one questions who benefits from policies or government initiatives in the promotion of indigenous knowledge. The literature unfortunately does not clarify this distinction seen within forms of marginalized knowledge. It simply puts all marginalized knowledge or worldviews under the label of indigenous knowledge.

3. Interchangeably used terms: local, traditional, and indigenous

Some scholars, such as Semali and Kincheloe (1999), Sillitoe (2002), Dei, Hall, and Rosenberg (2000), and Agrawal (1998; 2002), and practitioners from the World Bank, the United Nations; Society for Research and Initiatives for Sustainable Technologies and Institution, the World Intellectual Property Rights Organization, and the World Health Organization[34] interchangeably reference the terms indigenous, traditional, and local knowledge.[35] In addition, indigenous knowledge is also interchangeably used with endogenous (Escudie, 2004), context-specific, and as "rural people's knowledge, insider knowledge, indigenous technical knowledge, traditional environmental knowledge, people's science and folk knowledge" (Fischer, 2004 pg. 8). Local and traditional are most often interchanged with indigenous.

Indigenous knowledge is interchangeably used with local knowledge in literature and practice (Ellen and Harris, 2000 pgs. 1-2 in Fischer, 2004) because both are locally available and shared. Local knowledge, however, is knowledge that is locally situated; it is not necessarily indigenous knowledge (Antweiller, 1998). Local knowledge generally

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[34] For example, on their website, the Indigenous Knowledge for Development Program interchangeably uses local and traditional for indigenous. See www.worldbank.org/afr/ik. (Last accessed on February 21, 2008).

[35] Indigenous knowledge is also commonly used with "rural people's knowledge, insider knowledge, indigenous technical knowledge, traditional environmental knowledge, people's science and folk knowledge" (Fischer, 2004 pg. 8).

addresses all knowledge both dominant and marginalized of local communities or communities of practice in an area. Therefore, local knowledge can also be a nation state, a society, a university or a meeting (Evers, 2003).

Traditional knowledge, on the other hand, carries a similar definition to that of indigenous knowledge. Traditional knowledge can be defined as knowledge with a historic past which reflect the continuous use of practices or customs based on their culture[36] that are vital and central to a community (Otto and Pedersen, 2005).

Unlike the literature on indigenous knowledge, literature on traditional knowledge does not seem to limit the discussion to marginalized or poor populations. For example, Karnatak classical music is often cited as the traditional system of music or musical knowledge of South India. Knowledge of Karnatak classical music and the vocalists, however, are generally upper caste members in the Hindu religion (Subramanian, 2006).

Traditional knowledge can be re-created by groups of communities in other geographic locations. For example, Appadurai (1996) discusses this concept in his work. He notes that communities living away from their home environments (such as immigrants in the U.S.) can re-create environments to practice traditional knowledge forms. These knowledge forms, however, are often practiced with adaptations to their new local environments.

Although many anthropologists have questioned the need to distinguish between the various knowledge forms and are interested in more of the interconnections between

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[36] Culture can be defined as the, "interactive symbolic [elements] in an environment…which humans [use to] live and communicate" (Donald, 2000 pg. 23). Furthermore, Evers and Gerke (2003) write that culture of a community influences how they produce knowledge or practices and Masemann (1999) adds that it impacts how they communicate their knowledge and ideas with one another and with members outside their community. Although the culture existing in a community is not static, and as Niezen (2003) writes it is a "verb," it does, "maintain a satisfactory continuity of their past" (Maybury-Lewis, 2003).

knowledge (Ellen and Harris, 2000 pgs. 25-26 in Fischer, 2004), the plurality of terms used to describe knowledge outside of conventional knowledge can lead to a misunderstanding of the terms indigenous, traditional, and local knowledge and the context these terms are used (Srikantaiah and Rueger, 2008). Since the discussion on assigning appropriate terminology for marginalized knowledge, outside of conventional knowledge, is intense, this is important to further research and determine appropriate terminology for the various forms of knowledge.

4. Conclusion: indigenous knowledge

The term indigenous knowledge, however, seems to be a more popular label to describe marginalized knowledge at a global level. The World Bank, Pennsylvania State University, and the United Nations, among other organizations use the term indigenous knowledge and have created indigenous knowledge programs or initiatives in their institutions. One reason for their use of indigenous knowledge over traditional knowledge could be because the term traditional is seen as limiting and a hindrance in some fields. For example, although the development theory of modernization has been challenged by development scholars and many major development organizations believe they have moved beyond the term used during the development planning era (Lachenmann, 1994 and Faschingeder, 2001), current practices in development often still follow the basic principles of the modernization theory, which include exchanging "traditional" values for "modern" values (So, 1999 pg. 36).[37] Therefore, traditional knowledge can be seen as an obstacle to development.

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[37] See also Fagerlind and Saha (1989) for discussions on development and the modernization theory.

Indigenous knowledge, on the other hand, which as discussed in the indigenous peoples section, has been associated with political and human rights, therefore, use of this term can potentially bring more political attention to marginalized knowledge. For example, when institutions such as the World Bank identify indigenous knowledge, it is generally entered in a database, showcased on a website, or referenced as a best practice with the expectation that this knowledge can be used by other communities facing similar development problems.[38],[39] These knowledge forms, originating from marginalized communities, are made available globally and labelled as indigenous knowledge to bring them political attention, for funding purposes or other rights, and highlight their marginalization.

Once again, however, it is unclear as to what is constituted as indigenous knowledge. Some forms of traditional knowledge that may be seen as a limiting factor to development or labelled as witchcraft or voodoo – which fit the definition of indigenous knowledge - can be filtered out and not included as indigenous knowledge. Literature and practice needs to clarify what knowledge is being addressed under the umbrella of indigenous knowledge. This will also help programs, at the World Bank, Pennsylvania State University, and the National Institutes of Health, and other institutions be able to better describe what knowledge they are referring to.

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[38] The World Bank's Indigenous Knowledge for Development program discusses this practice of sharing knowledge as community-to-community development. They have financed a number of projects in which local communities have shared knowledge and best practices with one another. See www.worldbank.org/af/ik. (Last accessed on February 21, 2008).

[39] In addition, in the area of intellectual property, assigning intellectual property rights to only some traditional knowledge also brings them global attention.

Part 2 – Indigenous Knowledge in Education, Health Sciences Research, and Development

A. Introduction

Over the last decade indigenous knowledge has become an integral part of work in development (Agrawal, 2002 and Gorjestani, 2004),[40] education systems (Semali and Kincheloe, 1999 and SRISTI Report, 2001-2003), and in health sciences research (Dei, Hall, and Rosenberg, 2000; Yuan and Lin, 2000; and Shankar and Venkatasubramanian, 2005). These fields have recognized the significance and importance of indigenous knowledge and also have made efforts to recognize indigenous knowledge holders.[41]

In the field of development for example, the Indigenous Knowledge for Development program at the World Bank, a multilateral development organization, is advocating for the use of indigenous resources and knowledge in development practices. In the program's work in the region of, Tanga, Tanzania they illustrate the importance of traditional healers by reporting that there is only one modern medical doctor for every 33,000 residents, but there is one traditional healer for every 343 residents and one healer for every 146 rural residents (Scheinman, 2002). The program uses evidence, such as that found in, Tanga, Tanzania, to show that the integration of indigenous resources and knowledge in development can reach a wider percentage of the population. This is in part because indigenous resources are locally and more readily available.

Furthermore, the work being done in these fields highlights the continued use of indigenous knowledge and how indigenous knowledge holders trust and rely upon these

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[40] Some local governments have also been instrumental in advocating for their indigenous knowledge. Examples will be discussed in the development section of the paper.
[41] The World Intellectual Property Rights Organization has especially done extensive work in the area of intellectual property rights for indigenous knowledge holders.

resources for their survival and livelihoods. For example, the World Health Organization (WHO) reports that approximately 80% of Africans use indigenous knowledge and resources as their primary health care (Bannerman, Burton, and Chen, 1993).[42] In addition, in Southern Africa, the values of indigenous medicines in the market are estimated to be between $75 million to $150 million per year.[43] Over 1000 indigenous crops and medicinal plants are actively traded in the informal market of this region and several hundred thousand people are income earners in this industry.[44]

In education, a number of academic centers have developed in universities to advance the study of indigenous knowledge and create research collaborations with local communities. The Indian Institute of Management Ahmedabad's Society for Research and Initiatives for Sustainable Technologies and Institution (SRISTI) and Pennslyvania State University's Interinstitutional Consortium for Indigenous Knowledge (ICIK) are two examples. Primary and secondary conventional school curricula have also acknowledged indigenous knowledge and report that addressing indigenous knowledge helps students succeed within conventional school systems.

Health science institutions such as the National Institutes of Health and the Council for Scientific and Industrial Research (based in South Africa and India) are also recognizing the importance of indigenous knowledge in medicine and are creating protocols to scientifically validate their medicinal properties.

This section of the literature review will highlight the use and role of indigenous knowledge in these three fields and questions each field can further address. Indigenous

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[42] In South Africa alone, Pefile (2005) writes that 30 million South Africans consult traditional healers for their primary healthcare needs.

[43] Pefile (2005) estimates this value to be $200 million per year.

[44] See the Project Commercial Products from the Wild (CPWild): http://www.cpwild.co.za/. (Last accessed on February 21, 2008).

knowledge will be defined based on the definition provided in the previous literature review section: knowledge existing outside conventional knowledge or non-formalized knowledge of marginalized, rural, or poor local communities or people.

B. Indigenous knowledge and education

According to Easton (2004) education and indigenous knowledge go "hand in-hand" because education plays a key role in "transmitting, accumulating, enhancing and transforming [indigenous knowledge]" (Easton, 2004 pg. 1). Likewise, indigenous knowledge can hold important learning models or patterns useful in conventional education.

Literature also indicates that indigenous knowledge is important in helping students alleviate disconnects they face between home and school life (Kawakami, 1999; Armstrong, 2000; and Srikantaiah, 2005b). This is especially important at primary and secondary school levels when students are developing basic functional skills such as reading, writing, and mathematics. The greater the relevance students see in the material they are learning the better they are likely to do (Jegede, 1999). As an example, Armstrong (2000) writes that one of the biggest challenges Native American students face, when attending conventional schools,[45] is separation from their families and family values – especially for students who are forced to attend schools outside of their reservations or attend boarding schools. She notes that Native American students not only suffer in their school achievement, but also, are more susceptible to mental health issues, such as depression, when they come back home (Armstrong, 2000).

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[45]Learning institutions outside conventional schools can include non-formal education and experiential learning.

Unfortunately, conventional education systems in many countries do not support the study of indigenous knowledge. The literature in this field highlights three important critiques about conventional education systems: a) they mainly prepare students to meet the needs and demands of the market; b) language of instruction and learning, especially in scientific fields, is mainly in the English language; and c) limited opportunity exists for indigenous knowledge to be a part of conventional education models.

1. Education for the market

Scribner and Cole (1973) write that conventional education systems do not allow students to value their indigenous knowledge and instead represents a, "specialized set of educational experiences which are discontinuous from those encountered in everyday life and [which] promotes ways of learning and thinking which often run counter to those nurtured in practical daily activities" (Scribner and Cole, 1973 pg. 553). These "specialized set of education experiences" can be thought of as skills needed for work in conventional work environments. An example skill is fluency in the English language. Students only having knowledge of a local language, therefore, may have difficulty finding a job.

Furthermore, in Loveland's interview of Jamil Salmi, a higher education economist at The World Bank, Salmi (2006) says that in the context of higher education students should learn information and be trained for jobs that are needed for the market. They should also, he notes, be able to use this information to adapt to changes and the

demands of the market.[46] The market that Salmi (2006) is referring to, however, coincides more with conventional knowledge, and therefore, may not reflect students' prior knowledge or what may be needed for them to work in their home environments. In addition, Couture (2000) writes that universities tend to emphasize their education on issues of "organization, efficiency, competition, and quantitative results" (Couture, 2000 pg. 163). These qualities, however, are generally associated with doing well in conventional knowledge and may not easily translate to some communities' worldviews or their indigenous knowledge.

In this way, students who are able to relate to the information taught in conventional education systems are more likely to succeed and meet the demands of the market. Students who do not perform according to the benchmarks or standards set by conventional education systems are left behind or struggle upon graduation. Therefore, the process of cultural reproduction[47] is reinforced through conventional education systems because current day educational institutions do not foster learning environments suitable for all types of students.

Some initiatives have been implemented to address this issue. For example, the Popular Participation in Curriculum and Instruction Project (POPCI), directed through World Learning for International Development, has institutionalized aspects of Ethiopian indigenous knowledge in primary and secondary school systems in Ethiopia.[48] The

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[46] Tertiary education is one of the priorities in education at the World Bank. See thematic group Education for the Knowledge Economy. See www.worldbank.org/education. (Last accessed on February 21, 2008). The World Bank defines tertiary education as post-secondary education that is not limited to universities.
[47] For instance, sustaining inequalities present in class, gender, and race. Apple (1982) suggests this.
[48] PoPCI was implemented in parts of Ethiopia as a pilot project in 2001. It is important to note that the PoPCI initiative received support (non-financial) by the Ethiopian government because around this time the Ethiopian government had recently implemented a policy to integrate indigenous knowledge (they called it local knowledge) into conventional curricula. Government support for these types of initiatives is important and will be discussed briefly in the development section.

PoPCI initiative did this by teaming classroom teachers with "local experts" to create lessons and teach topics on their indigenous knowledge, such as carpentry, pottery, indigenous medicine and agriculture (PoPCI Report, 2001). These indigenous knowledge based topics were taught in combination with conventional knowledge. After students graduated from secondary school, they had a diverse skill set which allowed them to work either in their home communities or in conventional workforce. Although programs like PoPCI are limited in number, these models are important to study and see what may be adaptable for other communities.[49]

2. Scientific communication in English

English has become one of the primary languages of instruction and learning, especially in scientific communication, since the 1990s (Schugurnsky, 1999). Due to the wide use of English as the primary language in science, many communities are concerned their native languages will disappear. As one example, the Dutch are worried that English medium schools and universities will replace the teaching of and communication in the Dutch language (Schugurnsky, 1999). In addition, Chenni (2005) notes that in Bangalore, India, because of the recent development of the information technology (IT) sector, English has nearly replaced the local language Kannada – especially in science and technology communication. Furthermore Chenni (2005) writes that since Kannada is

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[49] However, it is also important to note that there are examples where the integration of indigenous knowledge into conventional education systems have not been successful. For example, Sarangapani (2003) critically analyzes an Indian government initiative, The National Curriculum Framework 2000 (NCERT), which is designed to incorporate indigenous knowledge into conventional school systems. She writes that these types of integration efforts fail when a community's indigenous knowledge is based on oral traditions and no written documentation exists. In her work with the Baiga community (a tribal community in Central India), she writes that the children rejected the knowledge taught in the conventional curriculum despite it making connections to their indigenous knowledge. These cases address the complexity and diversity of indigenous knowledge and that other alternatives need to be researched.

not needed for modernization or to succeed in the global economy, it has become, "ghettoised as a vernacular" and devalued in Bangalore.

Indigenous knowledge has also been neglected in higher education models. Couture (2000) writes that this may be because universities do not allow disciplines to teach knowledge that has not been validated or standardized by conventional knowledge.[50] Universities, with their goals of nation building, generating political thought (Altbach, 1992; Samoff, 1999), and producing and disseminating scientific thought (Altbach, 1992), are ideal places to house indigenous knowledge and foster their growth alongside or integrated with conventional knowledge.

As an example, the Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI), a program through the Indian Institute of Management, in Ahmedabad, Gujarat, produces a scientific journal with regular contributions from poor indigenous knowledge holders who write about their grassroots innovations in their local language.[51] In addition, Pennsylvania State University's Interinstitutional Consortium for Indigenous Knowledge also encourages the integration or collaboration of grassroots research with research at the university level.[52]

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[50] He notes, however, that the production of indigenous knowledge is actually similar to conventional knowledge because both are based on humans making "assumptions" about reality. Many of these assumptions made in conventional knowledge, he points out, cannot be validated by the conventional knowledge paradigm (Couture, 2000). Nader (1996) also agrees with this and notes that today's science may actually become tomorrow's "pseudoscience" (Nader, 1996 pg. 2). Since there is uncertainty in conventional knowledge, they are not appropriate to hold benchmarks to measure indigenous knowledge.

[51] See www.sristi.org (Last accessed on February 21, 2008)
[52] See http://www.ed.psu.edu/icik/. (Last accessed on February 21, 2008).

3. Limited opportunities for indigenous knowledge

Educational institutions also tend to represent the culture of the dominant social group in a discipline or school community (Scribner and Cole, 1973) giving limited space and opportunity for indigenous knowledge to be integrated or institutionalized. For example, the celebration of some religious holidays over others in U.S. school system, shows how certain religious groups can dominate what is celebrated and recognized in education.

Unfortunately, many conventional education systems are ill-equipped to host appropriate curriculum and challenge these processes of cultural reproduction (Apple, 1982) or to integrate indigenous knowledge. In addition Apple (1982) writes that educational institutions simply act as "sorting devices" (Apple, 1982 pg. 43) by fostering the process of cultural reproduction.[53] Therefore, students who are advanced, such as economically or socially, and can work well in the conventional knowledge paradigm, are at an advantage, and remain ahead.

In K-12 conventional education in Hawaii, Kawakami (1999) writes that in order for Native Hawaiian students to succeed they are forced to leave their culture at home and adopt to the values and behaviors that equate to being successful in the Western World[54] (Kawakami, 1999).[55] In addition, Mule (1999) writes that the teaching of vernacular languages in local community schools, such as rural areas in developing countries, is often times not defined as educating the community to be literate. These languages, he points out, are instead treated as not useful for "success" after education

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[53] For instance, sustaining inequalities present in class, gender, and race. Apple (1982) suggests this.
[54] Or to be successful in a world dominated by conventional knowledge paradigms.
[55] Feinstein (2004) also supports Kawakami's work in his research on Ecological knowledge in Hawaii.

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(Mule, 1999 pg. 232).[56] Therefore, more work needs to be done in create better spaces or opportunities for indigenous knowledge in conventional education models.

4. Conclusion: indigenous knowledge and education

To conclude, indigenous knowledge, which can also be considered the prior knowledge students bring with them into a classroom (Kawakami, 1999; Jegede, 1999; and Srikantaiah, 2005b), reflect students' culture and identity and also is valuable information to understand how a student will perform and adapt to knowledge taught in conventional education systems.[57] In addition, from a postcolonial perspective, since indigenous knowledge was devalued and disregarded during periods of colonization, acknowledging indigenous knowledge as prior knowledge in the school system can challenge conventional knowledge and show that it is not the universal truth.[58]

When education is not taught merely as "deposit-making" (Friere, 1993 pg. 60) information, students also have the opportunity to understand the relevance and meaning of their indigenous knowledge alongside other knowledge. Therefore, the diversity of worldviews students bring to a classroom is highlighted and new ways of thinking and learning are introduced into conventional education systems.

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[56] Kerala, a southern state in India, is a good example where the local language, Malayalam, was successfully used to increase literacy rates. The high literacy rates impacted other trends such as a decrease in HIV/AIDS rates. The Kerala Sastra Shahitya Parishad, a social movement, is one of the movements responsible for these trends. See http://www.rightlivelihood.se/recip/kerala.htm. (Last accessed on February 21, 2008).

[57] Hewson and Hewson (1983) also support this with their research on science education in Soweto, South Africa.

[58] Hickling-Hudson, Matthews, and Woods (2004) discuss how conventional knowledge was taught as the universal truth during colonization and suggest that discussions from a postcolonial perspective can help bring back attention to the diversity of knowledge systems.

Acknowledging indigenous knowledge, however, within conventional educational institutions is one step towards challenging conventional knowledge. In the following two sections, two other significant steps will be discussed – indigenous knowledge integrating with conventional health sciences and international development work.

C. Health sciences research and indigenous knowledge

As mentioned earlier, the international recognition for indigenous systems of medicines[59],[60] stems back to the late 1970s. In 1977, when dilemmas of inadequate allocations of conventional medical resources to developing areas began to arise globally, the World Health Organization (WHO) started an initiative to acknowledge indigenous systems of medicine alongside conventional health care systems.[61] More recently, over the last decade, the US National Institutes of Health (NIH),[62] is also doing research on the safety and efficacy of indigenous systems of medicine. They provide information about indigenous medicines and alternative treatment options on their website (oriented more towards US patients, but can also be used by other countries),[63] and also have sponsored projects to validate treatments used by traditional healers.[64]

The literature also reflects that indigenous systems of medicine and other indigenous systems of science, such as agriculture, are heavily used, very well respected

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[59] In this section, I often use the phrase indigenous systems of medicine, indigenous healthcare systems, or indigenous systems of science in place of indigenous knowledge. They mean the same; however, the former phrases specifically relate to fields of medicine or scientific knowledge systems.

[60] Indigenous systems of science are also commonly referred to as traditional environmental knowledge (TEK) (Hughes, 2003).

[61] See www.who.org for more details. (Last accessed on February 21, 2008).

[62] Based in the USA

[63] In the Western hemisphere, due to epidemics which modern medicine has been unable to cure, such as cancer, there has been an increased interest by the general public regarding the use and validation of indigenous medicines. Many people are joining health activists for balanced and holistic medical treatments, which include both modern and indigenous approaches to medicine and prevention (Rosenberg, 2000).

[64] See http://nccam.nih.gov/. (Last accessed on February 21, 2008).

and easily accessible for local citizens in many developing countries (Sillitoe,1998; Norton, Pawluk, and Sandork 1998; Dei, Hall, and Rosenbergk 2000; Shroff, 2000; Yuan and Lin, 2000; Sillitoe, 2002; Scheinman, 2002; Mahindapala, 2003; and Shankar and Venkatasubramanian, 2005).   These systems of medicine are also being used by individuals living in developed countries (Rosenberg, 2000 and Ng, 2000).

In Sri Lanka, for example, Sri Lankans have used the medical system Ayurveda[65] for more than two thousand years and traditional healers who practice Ayurveda are one of the most important members of the Sri Lankan society (Mahindapala, 2003). In fields such as agriculture local farmers' indigenous approaches in finding grassroots solutions to land degradation have also been linked to conventional scientific concepts in agroecology and ethnoscience (Norton, Pawluk, and Sandor, 1998). Norton, Pawluk, and Sandor (1998) note how civilizations have, "thrived for millennia completely outside the realm of conventional science, agriculture, and belief systems, [and] offer truly alternative views of ecology and agriculture that stem from long-term use and conservation of natural resources" (Norton, Pawluk, and Sandor, 1998 pg. 333).

In developed nations the interest in the use of indigenous medicines is rising because people are looking for alternatives to conventional medicines and preventive care as opposed to treatment after the diagnosis of an illness. Indigenous medicines, such as Traditional Chinese Medicine,[66] have therefore been sought out in these populations (Ng, 2000 and Rosenberg, 2000).

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[65] A holistic system of medicine and health care (which originated in India) and one of oldest documented forms of medicine (Shroff, 2000).
[66] Ng (2000) writes that Traditional Chinese Medicine, "is a modern term that refers to a style of medicine that emerged after Communist Revolution in 1949. Many of the healing practices have a common philosophical origin, one based in Taoism" (Ng, 2000 pg. 173).

Despite the international and select scientific recognition indigenous systems of science may have received over the last twenty years, they still face many obstacles in furthering their growth and development. This may in part be due to historical events such as colonization, pressures and impacts from modernization, and other factors, which have undermined indigenous knowledge and labeled them as "inappropriate" or "not validated" to conventional knowledge.

I have organized the challenges indigenous systems of science face against conventional systems science in the field of health sciences into three areas: i) colonization and modernization; ii) philosophical and cultural differences; and iii) scientific validation procedures.

1. Colonization and modernization

During periods of colonization, French, English, and Spanish colonists introduced 'reductionist'[67] medicine as the solution to health problems in their colonies (Shroff, 2000). Reductionist medicine, however, Shroff (2000) notes undermined certain indigenous social aspects of health. These social aspects include indigenous religions, oral traditions, traditional healers and other indigenous knowledge, which were originally used for healthcare. Balasubramanian (2000) adds to this and writes that when the British colonized India, they found India's indigenous approaches to treatments in health and indigenous paradigms of scientific thought to be extremely different to their own knowledge. Therefore, the British stated that no connection could be drawn between the

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[67] The reductionist concept is influenced by Cartesian's philosophy which implies that the human body is simply a mechanical system and each compartment operates and functions separately (Ogawa, 1995). Furthermore, there is no connection between the body and mind.

Indian models and the British model. Hence, indigenous systems of science were devalued as they could not be validated or used to the standards held by the British.

Modernization efforts, based on conventional knowledge, have also undermined indigenous knowledge forms of science and medicine. These efforts include the implementation of conventional hospitals, promoting the dissemination of only conventional medicines, and the design of healthcare systems, based on conventional knowledge. They have not allowed space for indigenous knowledge to flourish (Rosenberg, 2000).

2. Philosophical and cultural differences

One of the main reasons indigenous systems of science may be marginalized in research and funding is because their indigenous scientific methods do not follow the Western scientific method (Owaga, 1995; Jegede, 1999; Snively and Corsiglia, 2000; Yuan and Lin, 2000; and Briggs and Sharp, 2004).[68] The Western scientific method has in the past produced miracle drugs, like the polio vaccination, which has helped eliminate polio in many parts of the world. Hence the Western scientific method is generally relied upon or used as the benchmark to validate other forms of knowledge and their approaches to treatment (Briggs and Sharp, 2004).

In the study of indigenous knowledge, however, the Western scientific method is limiting. The Western scientific method suggests that a biomedical model can be studied

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[68] The Western scientific method follows these definitions: "a method of research in which a problem is identified, relevant data are gathered, a hypothesis is formulated from these data, and the hypothesis is empirically tested" (Random House Dictionary 2006) and "Scientific method is a body of techniques for investigating phenomena and acquiring new knowledge, as well as for correcting and integrating previous knowledge. It is based on gathering observable, empirical, measurable evidence, subject to the principles of reasoning". See Random House Dictionary (www.dictionary.com) for the former definition and Wikipedia (http://en.wikipedia.org/wiki/Scientific_method) for latter definition. (Last accessed on February 21, 2008).

in isolation from other systems in its the environment and suggests that there is only one reality or "universal truth" (Ogawa, 1995 and Snively and Corsiglia, 2000). All forms of knowledge are expected to meet the standards and fit into being the one reality or universal truth. In addition, conventional science systems suggest that science is a part of an institution whose members have common knowledge and aptitudes (Nader, 1996). Therefore, everyone within a conventional paradigm is in agreement that there is a "universal truth" and they aim for this in their research.

Indigenous science knowledge, however, functions and relies upon the other factors in their environment, and reflects multiple perceptions of reality (Owaga, 1995; Nader, 1996; and Snively and Corsiglia, 2000). Agrawal (1995) also agrees with these scholars and writes that indigenous systems of science are tightly integrated with the livelihoods of local people and are not just "abstract ideas or philosophies" or "abstract representations of the world" (Agrawal, 1995 pg. 422).[69]

For example, the Gwaumauri' Anga community in the Solomon Islands have nine key cultural values which are tied to their well-being or health of their society: kindness, peace, stability, humility, sharing, hospitality, love, generosity, and honesty (Watson-Gegeo and Gegeo, 1986 in Gegeo, 2000). These nine key cultural values are deeply integrated with the community's daily activities on the island and tied to the island environment. If these cultural values are studied under the lens of Western science, they are extracted from their local environment and disassociated from the community

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[69] Nader (1996) suggests that anthropologists are to blame for differentiating between conventional and indigenous science knowledge from their initial documentation of cultures. Pettinari (2002) also suggests that current day studies of indigenous knowledge continue to keep it separate from conventional knowledge.

activities. This results in the loss of fully comprehending how the cultural values contribute to the well-being and health of the Gwaumauri' Anga society.

Polyani (1997) suggests that the knowledge lost, for instance through the lens of Western science, is the tacit knowledge of an individual or a community. He defines tacit knowledge as the knowledge people carry with them, which is not documented or verbally expressed (Polyani, 1997). Since this knowledge only exists within the minds of people, or communities of people, it can be neglected or unidentified through Western science.[70]

Conventional science research does not acknowledge the strong connection indigenous knowledge has with its environment or other factors such as rituals or religions.[71] Eyzaguirre (2001) adds that studying indigenous knowledge out of its original environment may be convenient for conventional science researchers; however, it destabilizes the function of indigenous knowledge.[72] Ogawa (1995) and Snively and Corsiglia (2000) also agree with the viewpoints presented in this section by noting that the plurality of indigenous knowledge, and its association with multiple and diverse cultures, can be seen as problematic by conventional scientists because there is no one "universal truth" or "universal reality." Therefore, indigenous knowledge is neglected in research and not validated for use.

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[70] Nonaka and Takeuchi (1995) also discuss the importance of tacit knowledge from a business perspective. In one of their case studies, they write that the accurate replication of a bread machine was dependent on tacit knowledge as the written instructions failed to incorporate a step that one the bread machine makers did not verbally express.

[71] Agrawal (2002) also notes the importance of rituals, religions, and other factors and questions how this knowledge can be databased.

[72] Eyzaguirre (2001) believes that only local people should have the power to study their indigenous knowledge. Agrawal (1995, 2002) suggests similar ideas in his writings.

3. Validation procedures

Since there are a number of differences between indigenous and conventional knowledge, conventional scientific validation may not be appropriate to validate indigenous systems of science. Conventional scientific protocols and international standards set by conventional scientists[73] do not take into consideration the local development and use of indigenous medicines (Shankar and Venkatasubramanian, 2005 and Yuan and Lin, 2000). Therefore, many scholars believe that scientific validation procedures need to be more culturally appropriate to indigenous systems of medicine (Yuan and Lin, 2000; Shankar and Venkatasubramanian, 2005; Gauniyal, Rawat, and Pushpangadan, 2005; Patwardhab, Warude, Pushpangadan, Bhatt, 2005).

In the validation of Traditional Chinese Medicines for use in the United States, Yuan and Lin (2000) note the U.S.'s Food and Drug Association (FDA) protocols cannot be used. The authors instead propose alternative approaches to thoroughly understand and validate the medicinal properties of Traditional Chinese Medicine. For example, they note that herbs and plants need to be collected during specific times of the day or grown during specific times of the year, as opposed to being collected at the convenience of the researcher or funding agency. Proper collection of herbs and plants, they write, is vital to receive the maximum effect of the medicines. They also note that standardization procedures should take into account the multiple mixtures that are present in one traditional medical treatment.[74],[75]

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[73] Such as those set by the WHO, NIH, or FDA

[74] Gauniyal, Rawat, and Pushpangadan (2005) and Patwardhan, Warude, Pushpangadan, Bhatt (2005) also describe the importance in using these types of procedures in indigenous systems of medicine from India.

[75] The NIH's National Center for Complementary and Alternative Medicine has acknowledged this in their work and research mechanisms of action for indigenous medicines as mixtures of herbs as opposed to testing single agents.

As another example, Shankar and Venkatasubramanian (2005) also note that the Hindu Vedic text[76] recommends collecting the roots of turmeric, a spice, only during the night. This is because "the bioactivity of turmeric collected at night is significantly higher than that collected during the day" (Shankar and Venkatasubramanian, 2005 pg. 2).[77] If turmeric is collected during the day then the spice may not be validated as a medicine because the medicinal properties may be detected.

Indigenous validation procedures, which may be helpful in bringing out the full medicinal value of indigenous medicines, however, are not easily accessible or documented. Further research in this area needs to be supported.

4. Conclusion: health sciences research

Over the past decade, Balasubramanian (2000) notes that much research has been conducted to validate various indigenous systems of medicines and include this knowledge in the on-going conventional scientific dialogues. For example, pepper, an herb traditionally used to repel flies and kill insects in foods, is also known to enhance the transport of conventional medical drugs across the cell membrane.[78] Rosenberg (2000) provides another example from Native American communities. She writes that the herb, *essiac*, found on tree bark and used by the Natives in their tea to prevent diseases such as cancer, actually, "contains inulin, an enzyme that breaks down the

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[76] Holy Scriptures written in Sanskrit.
[77] This research, to connect the rationale explained in the Vedas to language of conventional science systems, was conducted by staff at the Foundation for Revitalisation of Local Health Traditions (FRLHT) directed by Dr. Darshan Shankar.

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[78] Balasubramanian (2000) also notes how about 15 years ago, pharmacologists determined that acupuncture treatment increased endorphin and opioid-peptide levels in limbic systems. This explains why acupuncture eases pain from headaches, body aches, and migraines.

mucous coating on cancer cells and allows the body's defense system to penetrate them" (Rosenberg, 2000 pg. 147).

Yuan and Lin (2000) also note the importance of integrating conventional medicines with Traditional Chinese Medicine. They write that such efforts are already taking place in North Korea and parts of China, partly due to economic necessity,[79] but also due to improving the quality of life. As an example, they write that cancer patients in these countries receive chemotherapy, radiation, and surgery to fight cancer cells. In addition to these conventional treatments, however, they also receive Chinese herbs to fight the side effects of these conventional treatments such as nausea, pain, and weight loss. They believe that this type of integrated approach will help maximize treatment for patients.[80]

Unfortunately, further research is needed to decrease the gap between indigenous systems of science and conventional science systems. Norton, Pawluk, and Sandor (1998) argue for the creation of collaborative efforts to bridge gaps between the two science knowledge systems and find funds to design policies that recognize indigenous systems of science and sustain them. Jegede (1999) firmly believes that further efforts need to be made to recognize indigenous science thought processes or scientific methods. He believes that uncovering these processes or methods is fundamental, as it will allow conventional knowledge to understand the mechanisms or the way indigenous knowledge works.

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[79] For example, Traditional Chinese Medicines are more affordable and readily available.
[80] Acknowledging indigenous medicines in national healthcare insurance policies are also important. Suzuki (2004) writes that unlike Western countries, Japan's public health insurance covers complementary and alternative medical treatment.

Efforts need to be made to acknowledge the plurality of knowledge in science and understand how knowledge can work together and enhance the scientific dialogue. When efforts like this are made, other fields, such as development work, discussed below will better understand the importance and value of indigenous knowledge.

D. Development and indigenous knowledge

Over the last decade, indigenous knowledge has become a part of international development dialogues.[81] Indigenous knowledge is generally promoted as a cost-effective and sustainable solution to development problems[82] (Dei, Hall, and Rosenberg, 2000 and The World Bank's Indigenous Knowledge for Development Program) and used to highlight the importance of community participation in development (Sillitoe, 2002 and The World Bank's Indigenous Knowledge for Development Program).

Shroff (2000) illustrates this well in her work with Ayurveda and shows how indigenous medicines are locally available and better accessible to rural populations in India. She also indicates that traditional healers are important members of their society and how their participation is important in community development.[83] She writes that: a) Ayurvedic traditional healers are located in rural areas where conventional medical practices are not readily available; b) traditional healers tend to be members of the local

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[81] These development efforts, however, can be considered as only recent initiatives because scholars and some development practitioners have been advocating for indigenous knowledge to be represented at the international level since the early 1980s (Brokensha, 1980; Sillitoe, 1998; Chambers, 1997; Long, 1992; and Warren, 1991, 1992).

[82] For example, indigenous medicines can be used in place of conventional medicines and address the issue of the high cost of conventional medicines and their importation from other Western countries (Reesor, 1991).

[83] Mahindapala (2003) also writes that Ayurvedic traditional healers are important members of the Sri Lankan society and should be considered in development initiatives.

community and share many of the cultural values of the local people,[84] therefore, local communities trust the healers and are familiar with their services; and c) the cost of Ayurvedic treatment is generally more affordable to patients coming from lower income backgrounds.

Below is a presentation of indigenous knowledge in the field of development. I focus on literature and analysis mainly from multilateral institution[85] perspectives as this is most appropriate for the research study. This section presents the following: i) An overview of indigenous knowledge in international development with a focus on multilateral institutions and ii) critiques on the role of indigenous knowledge in development: a) institutionalizing indigenous knowledge simply to create global commodities, b) inappropriately up-scaling indigenous knowledge to international development, and c) the representation of indigenous knowledge in international development.

1. Overview of indigenous knowledge in international development

The use of indigenous knowledge in development projects is easily seen in agriculture, resource management, medicine and environmental issues. For example, the World Bank has prepared many documents and seminars on the role of indigenous knowledge in agricultural development. Warren (1991), Sibanda (1998), and Essama (2005) are some examples. The US National Research Council has documented the value

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[84] See also Shankar and Venkatasubramanian (2005).
[85] A multilateral institution, also known as multilaterals or multilateral corporations, generally works with two or more countries and can provide them certain services, such as international aid. International development organizations, such as the World Bank, The World Trade Organization (WTO), United States Agency for International Development (USAID), or the United Nations (UN), are examples of multilateral institutions. Development practitioners in these organizations are in a powerful position to introduce indigenous knowledge into development projects and enhance the benefits of development assistance to poor or marginalized populations.

of indigenous knowledge in the conservation of biodiversity and sustainability in agriculture and natural resource management issues.[86] In addition, from 1996 UNESCO has collected and managed documents and information regarding preserving local cultures and biological diversity (Hay-Edie, 2004).[87]

The World Health Organization (WHO), as mentioned earlier, seems to be a pioneer among the multilateral organizations in the area of indigenous knowledge. The WHO began its work in this area in 1975 mainly to assist developing countries in having better access to medical resources. More recently, the World Bank (1998 – 2007) and the United Nations Development Programme (1996 – 1999) created "Indigenous Knowledge Programs" in their organizations in an effort to capture and document indigenous knowledge from communities in developing countries. These programs focus their work mainly on marginalized communities and they do not limit their work only to indigenous peoples.

The rationale behind these Indigenous Knowledge programs is to introduce topics of indigenous knowledge practices in areas of health, agriculture, education, into development polices and procedures so that this knowledge is a part of global development discourses and practices. Ultimately, these programs are advocating for the use of indigenous knowledge to facilitate development in local conditions and better serve local community's needs. The programs at the multilateral level also see indigenous knowledge contributing to innovations in areas of science and technology -

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[86] See http://www.nationalacademies.org/agriculture/. (Last accessed on February 21, 2008).
[87] See UNESCO Indigenous Knowledge Database at: http://www.unesco.org/most/bpikreg.htm. (Last accessed on February 21, 2008).

especially when science and technology are introduced to and innovatively adapted in local communities (Dei, Hall, Rosenberg, 2000).[88]

Databases, or other forms of documentation such as newsletter publications,[89] are one of the main methods used by these development programs to capture and institutionalize indigenous knowledge. In general, databases have added to globalization efforts by making all types of knowledge more accessible (Arnove and Torres, 1999) – for example, databases are available on-line or on websites. For instance, databases raise the awareness of indigenous knowledge to donor agencies, international organizations, or scholars and help create and inform policies (Agrawal, 2002). Furthermore, Agrawal (2002) notes that there are two main purposes in documenting indigenous knowledge. He writes that methods such as databasing: (1) can protect indigenous knowledge and preserve them from environmental destruction; and (2) can facilitate the mainstreaming or application of indigenous knowledge in development projects or other fields. Documenting and collecting indigenous knowledge in this way can also display it as "relevant" to a wider audience and help indigenous knowledge become a "fact" (Agrawal, 2002 pg. 291) that is valid for use within the field.

Since multilateral institutions work with two or more countries, local governments and their involvement with indigenous knowledge are important to briefly note here.[90] There have been some recent government initiatives to promote and preserve indigenous knowledge for development. Some examples include governments

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[88] See also Sillitoe (2002) for discussions in this area.

[89] For example, the World Bank's program Indigenous Knowledge Notes or "IK Notes" are used to promote their program more than their database.

[90] Agrawal (2002) and Srikantaiah and Rueger (2008) also note that it is important for governments to advocate for their indigenous knowledge because the international development community may be more willing to finance or integrate these knowledge into their development work programs or projects.

of Sri Lanka, which is the first country in the world to develop a ministry of indigenous medicines (Srikantaiah, 2005a),[91] Uganda[92] and Kerala[93] (a state in Southern India), which are working on including indigenous knowledge in their five-year plans,[94] and Tanzania and Kenya, which have developed policies to integrate indigenous and conventional medical systems (Chege, 2003).[95]

2. Critiques of indigenous knowledge and development

Although the World Bank, UNESCO, WHO, and other multilateral organizations have created databases, websites, and documents to raise awareness and mainstream or integrate indigenous knowledge, their initiatives are still critiqued by many scholars. These scholars mainly argue that international development organizations are not appropriately institutionalizing indigenous knowledge and acknowledging its dynamic characteristics. Some of the main critiques include: a) institutionalizing indigenous knowledge simply to create global commodities, b) inappropriately up-scaling indigenous knowledge for international development, and c) questioning validation processes used to identify and use indigenous knowledge for development. These issues are illustrated by Agrawal (1995, 2002), Wangoola (2000), Briggs and Sharp (2004), Sillitoe and Bricker

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[91] Ministry was implemented in 2000.

[92] Implemented in 1999.

[93] Implemented in 2002.

[94] See www.worldbank.org/afr/ik. (Last accessed on February 21, 2008).

[95] I am recognizing these government initiatives as it can be difficult for national governments to advocate for their indigenous knowledge partly because many governments have to depend on international aid and their guidelines for development. Although multilateral institutions such as the World Bank claim that they do not influence governments with their decisions in development, their viewpoints can be seen in the development projects they implement around the world. For example, some governments who were pressured to privatize public resources during the 1980s and early 1990s (Stiglitz, 2002) may now lack appropriate infrastructures to promote their indigenous knowledge.

(2004), Sillitoe (1998), and Srikantaiah and Rueger (2008), who all critique the institutionalization of indigenous knowledge in international development through multilateral development organizations.

a. Institutionalizing indigenous knowledge to create global commodities

Some scholars believe the development organization's process of selecting indigenous knowledge and institutionalizing it is equivalent to marketing and commercializing a product (Briggs and Sharp, 2004). Therefore, in this area scholars mainly critique the databases, websites, or other organizational mechanisms used to store and share indigenous knowledge.

Agarwal (2002) specifically questions whether indigenous knowledge is appropriately captured and represented in these institutions. He mainly attacks databases, where most forms of indigenous knowledge are stored at an international level, and argues that knowledge is organized into databases and institutionalized solely based on the biases of the development practitioner or database manager. He believes that these development practitioners or database managers simply use their positions of power to authorize and validate what indigenous knowledge should be institutionalized.[96] Therefore, only some forms of indigenous knowledge are highlighted in international development[97] and they are organized based on the interests of the development

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96 Organizations, such as *Insight*, which is a UK-based organization uses Participatory Video as a powerful research and development tool to address this problem.

practitioner or database manager. In addition, he notes that databasing indigenous knowledge simply highlights their differences to conventional knowledge. Rather, he suggests that similarities should also be showcased (Agrawal, 1995) so that meaningful collaborations can occur between the two knowledge systems.

Wangoola (2000) agrees with Agrawal (2002) and notes that the institutionalization of indigenous knowledge meets only the goals and objectives of the multilateral institution without acknowledging indigenous knowledge's dynamic nature and rootendness to the community in which this knowledge is practiced. Therefore, she believes that these international institutions are not appropriate places for the storage of indigenous knowledge.

From a postcolonial perspective, Briggs and Sharp (2004) also challenge the development paradigm of multilateral institutions and their work with indigenous knowledge. In particular, they question the interest institutions have in indigenous knowledge and suggest that their interest in these knowledge systems is a form of neo-colonization. For example, they note that practitioners simply treat indigenous knowledge as an "artifact" (Briggs and Sharp, 2004 pg. 13) and integrate this knowledge with their work depending on its usability in development. Furthermore, they note that representing indigenous knowledge, as a commodity, makes indigenous knowledge un-dynamic, static, and simply seen as a tool which can be delivered quickly for

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[97]. Which knowledge system is brought to the attention of the international community is equivalent to a lottery drawing. For example, India alone is home to 7,000 species of medicinal plants and 15, 000 herbal remedies (Shiva, 2000). Unfortunately, only a fraction of this knowledge will be represented by development organizations. In addition, the fraction of indigenous knowledge that is represented and codified as best practices may not be appropriate for development work in other communities.

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development purposes.[98]   These descriptions go against the characteristics used to identify indigenous knowledge.

b. Inappropriate up-scaling of indigenous knowledge for development

Since indigenous knowledge functions best at a local or community level, many scholars believe it should not be scaled up to global levels. Sillitoe and Bricker (2004) suggest that indigenous knowledge is not effective at an international level and believe that development results (using indigenous knowledge) are seen mainly in small-scale NGOs or work conducted at a grassroots level.[99] They write that successful small-scale efforts should not be used to inform or develop international development practices or policies because indigenous knowledge becomes decontextualized[100] and ineffective when separated from its environment. In addition, they note that it can take several years to understand how indigenous knowledge can inform development projects in one local area.   Unfortunately, at the international level a comprehensive understanding of indigenous knowledge is lacking as international guidelines follow different time lines for their work and expect faster development results.

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[98] Briggs and Sharp (2004) suggest that indigenous knowledge is represented as a commodity to further efforts of globalization.

[99] For example, Dr. Sudarhsan, an ASHOKA fellow, has devoted his medical career to working with tribal communities in India. In his work with the Soligas, a tribal community outside the city of Mysore, Karanataka, he lived with the community and helped the community build schools, hospitals, and other community related centers based on the community's indigenous knowledge (URS, 2005). Ashoka Fellows received grants for their work as social entrepreneurs. See http://www.ashoka.org/?gclid=CJ3rn9HCg4oCFRQdgQodXCWENQ. (Last accessed on February 21, 2008).

[100] Concept also discussed by Agrawal (1995) meaning indigenous knowledge is taken out of its local context.

c. Representation of indigenous knowledge in international development

Finally, many scholars, such as Sillitoe (2002), Semali and Kincheloe (1999), and Dei, Hall, and Rosenberg (2000), note that indigenous knowledge is often presented as inferior and backward in comparison to conventional knowledge. Bricker and Sillitoe (2004) suggest that because of this impression advocates of indigenous knowledge may appear as incompetent and lacking scientific knowledge (that is based on conventional knowledge paradigms).

For example, in a recent Washington Post article, Harrison (2006) who has over 20 years of experience in international development writes that a major obstacle to development is because of "culture." In his work in Haiti, he describes their religion as voodoo which "nurtures mistrust and irrationality" and suggests that this comes in the way of implementing effective health and education programs. Srikantaiah and Rueger (2008) suggest that the impression, such as Harrison's (2006), are also seen at the World Bank. Therefore, indigenous knowledge needs to break away from this stereotype and better establish themselves in conventional scientific fields at the international level (Bricker and Sillitoe, 2004).[101]

3. Conclusion: indigenous knowledge and development

These critics add to the discussion of the role and use of indigenous knowledge in international development by challenging the interest development practitioners have in these knowledge and how they are institutionalized in this field. In addition, these critiques are important as they challenge conventional development paradigms,

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[101] In addition, McGarth and King (2004) note that when Knowledge Management was introduced at the World Bank many of the World Bank staff members felt that using knowledge for development was not technically or scientifically strong.

particularly in multilateral institutions, and suggest that these institutions need to adapt alternative development paradigms or acknowledge that their approaches to development may not be appropriate for certain communities.

Although development institutions have taken an important step in globally recognizing indigenous knowledge, much work needs to be done to address the diversity and complexity of indigenous knowledge so that they are appropriately represented and effectively used in development.

E. Overall conclusion for literature review

As seen in this literature review, these three fields, education, health sciences, and development, have done significant work with indigenous knowledge. Although the three fields share common themes in restoring, revitalizing, and expanding indigenous knowledge alongside conventional knowledge, they also highlight their unique contributions and challenges in their work with indigenous knowledge. In addition, the literature also presents opportunities for further research and contributions – such as using appropriate terminology for labeling the knowledge systems used or of interest, alternatives to challenges marginalized students may encounter in conventional school systems, establishing appropriate validation techniques for indigenous medicines, and researching better approaches to institutionalizing indigenous knowledge in development practices.

III. Methodology

In this section, I detail the general logic and theoretical framework I used in this research study. This section includes: the justification for qualitative research, rational for using a critical theory lens, and description of the case study methodology. In addition, I detail the procedures I used, which include: sampling decisions, the data collected (documents, interviews, and audiovisuals), the validity, credibility, and generalizability of the study, assumptions I bring into the research study, and how I analyzed the data.

A. Justification for qualitative research

Marshall and Rossman (1999) write that qualitative research has "become increasingly important for the social sciences and applied fields such as education, regional planning, nursing, social work, community development, and management" (Marshall and Rossman, 1999 pg. 1). While quantitative research involves the, "measurement and analysis of casual relationships between variables, not processes…[and work done in this paradigm is] within a value-free framework" (Denzin and Lincoln, 2000 pg. 8), qualitative research, "seeks answers to questions that stress *how* social experience is created and given meaning" (Denzin and Lincoln, 2000 pg. 8).

Qualitative research will be important in my study because it will allow me to research each of my cases in their natural settings and allow me to understand participant perspectives and how they contribute and influence their respective cases. Maxwell (1996) writes that including participant perspectives into the research study is the key characteristic of qualitative research.

Marshall and Rossman (1999) describe that another key characteristic of qualitative research is using multiple methods. Therefore, in addition to studying participant perspectives and capturing their experiences in the program, I will also study documents or audiovisuals produced by the cases. Finally, since I worked with one of the case studies for ten months, this paradigm gives me an opportunity to reflect and analyze some of my data based on my work experiences (Firestone, 1987).

B. Rationale for critical theory lens

As mentioned in the introduction, scholars in this field generally study indigenous knowledge through postcolonial and postmodern discourses. Therefore, below I briefly detail these two discourses and my rationale to use a critical theory lens for this study.

Post-colonial discourse suggests that colonization destroyed local history, traditions, and cultures and created inequalities in relations and power (Dei, Hall, and Rosenberg, 2000). Scholars in this field, therefore, use postcolonial discourse to understand what indigenous knowledge was lost and destroyed and why this happened. Scholars also use this discourse to recognize the first descendants or original populations of post-colonial states. Dean and Levi (2003) write that studies in the postcolonial discourse help bring attention and appropriate human rights to the first descendents in postcolonial states.

Indigenous knowledge is also discussed through an anti-colonial discourse. Dei, Hall, and Rosenberg (2000) write that they prefer to discuss indigenous knowledge through this discourse as it brings out the "power held by local/social practice to survive the colonial and colonized encounters" (Dei, Hall, and Rosenberg 2000, pg. 7).

Therefore, they prefer to showcase the knowledge and power the colonized used to fight the colonizers.

Postmodern discourse came out of a response to the 19th century's period of Enlightenment and the early 20th century's focus on "technology, rationality, reason, universals, science, and the positivist, scientific method" (Creswell, 1998 pg. 79). The Enlightenment period is associated with the idea of modernization because there was a focus in development of thought that was separate from religion and other cultural factors (Tarnas, 1991). In addition, the modern scientific and technological fields use this separation to create a supposedly "universal" language for modernization. For example, in the field of development, postmodern discourse is associated with the modernization development theory because for many colonized countries modernization immediately followed decolonization (McMichael, 1996) and one of the tenets of the modernization theory advocates for the exchange of traditional ways life (or indigenous knowledge) for modern ways of life (So, 1990). Therefore, in many countries, after decolonization, modern science and technology replaced indigenous scientific knowledge systems and beliefs. Scholars in the field of indigenous knowledge use the postmodern discourse to question and challenge the ideas developed during the 19th and 20th century or in relation to modernization which may have eliminated indigenous knowledge for modern ideas.

The postmodern discourse also brings attention to groups who are oppressed because of their race, class, or gender, or other affiliations and encourages research to challenge systems of hierarchies (Creswell, 1998; Bogdan and Biklen, 2003; and Schram, 2003). Indigenous knowledge holders are a part of these oppressed groups because their knowledge does not belong to dominant races, classes, or genders. Therefore, through

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the postmodern discourse lens I can highlight knowledge held by marginalized communities or indigenous knowledge.

Postmodern discourse is generally studied through the qualitative paradigm from either critical or feminist theoretical perspectives (Creswell, 1998).[102] For my research, critical theory is of importance. Therefore, the methodology in this research study will attempt to analyze the data mainly through a critical theorist perspective.

Critical theory allows a researcher to conduct a study of a social institution or way of life, which has been oppressed; it challenges conventional or dominant institutions, forms of knowledge, or groups of people; or it can capture social struggles (Comstock, 1982; Creswell, 1998; Bodgan and Biklen, 2003). This lens is very applicable to my study of indigenous knowledge as these knowledge systems have been oppressed for centuries by colonization and modernization.   Therefore, I can explore the critiques from the literature review in my case studies and as Carspecken (1996) and Creswell (1998) note I can also contribute feedback or new alternatives to existing structures (i.e. to my case studies or the literature).

C. Description of case study methodology

Critical theory is generally applied to a case study in which multiple sources of data (i.e. documentation, participant observation, interviews, and other methods) are analyzed and interpreted (Creswell, 1998). Therefore, along with a critical theory lens, the case study methodology was used in this study. I studied three case studies in the

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[102] Some scholars such as Capper (1998) write that postmodern theory is not a critical theory and does not fall under any of the traditional qualitative research method paradigms. Capper (1998) believes that critical theory has been linked to postmodern theory because postmodern theory is the only qualitative research paradigm, which challenges conventional knowledge and brings attention to marginalized groups of people.

United States that have institutionalized indigenous knowledge in their work programs. These institutions are the Indigenous Knowledge for Development Program at the World Bank (Washington, D.C. headquarters), the Division of Natural Products at the National Institutes of Health (Bethesda, Maryland), and the Interinstitutional Consortium for Indigenous Knowledge at Pennsylvania State University (University Park, Pennsylvania).

Case studies are defined as the study of a bounded system of a case, or systems, and are studied over an extended period of time to collect in-depth data of multiple sources of information through observations, interviews, audiovisuals, documents, and reports (Creswell, 1998; Marshall and Rossman, 1999; and Bogdan and Biklen, 2003). This type of methodology best fits my research over other methodologies such as ethnography, grounded theory, phenomenology, or biography because I studied three bounded systems mainly using data from documents, interviews, and audiovisuals (multimedia and websites).

Within the case study methodology there are also various types of case studies, which include: multi-case studies, single-case studies, historical case studies, and observational case studies. Multi-case studies,[103] as the name implies, allow the researcher to study more on than one case whereas, a single-case study involves intensively studying one case (Bogdan and Biklen, 2003). I used a multi-case study methodology because I studied three case studies.

Multi-case studies can be more advantageous than single-case studies. For instance, Bogdan and Biklen (2003) write that the comparative case study methodology can be applied to multi-case studies. This methodology allows researchers to compare and contrast data collected across the case studies and make appropriate generalizations

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[103] Also referred to collective case studies (Creswell, 1998).

to the field. Since I collected data from three case studies, I also used the comparative case study methodology to make better generalizations about the opportunities and challenges associated in the institutionalization of indigenous knowledge in the Western hemisphere.

In summary, I critically studied three case studies using the multi-case methodology. In the following, I detail the process, which I used to carry out my methodology.

D. Procedure

In this research study, I used a multi-case study methodology. As recommended by Bogdan and Biklen (2003), I studied each case one at a time – not simultaneously – so that data is kept separately. I collected three types of information: documents; interviews (semi-structured); and audio-visual materials (websites, multimedia, photographs, and videotapes). Mainly, I collected, reviewed, and analyzed key documents, which helped me understand the case study in terms of its mission or goals, creation, past projects or activities, and its future directions (Marshall and Rossman, 1999). I also conducted semi-structured interviews to get reflections and experiences from staff members who have worked with the program. The interviews gave me insight to the work done in the program, which may not be documented in the externally published documents. Finally, I studied each program's external website and any multimedia they may have produced. Below I further detail my data collection process by discussing: sampling decisions, the document collection process, interview

information and protocols, how I plan to ensure standards of quality and validity, and how I plan to analyze data collected.

1. Sampling decisions

I used the purposeful sampling methodology to select my case studies and to select key informants to interview. Purposeful sampling is defined as, "choosing subjects, places, and other dimensions of a research site to include in your research to enlarge your analysis or to test particular emerging themes and working hypotheses" (Bogdan and Biklen, 2003 pg. 261). The case studies I have chosen are most relevant and useful to help me answer my research question and they are easily accessible (Creswell 1998).

The three case studies I have chosen to study are the World Bank's Indigenous Knowledge for Development Program, the National Institutes of Health's division of natural products, and Pennsylvania State University's Interinstitutional Consortium for Indigenous Knowledge. All three case studies are novel in their respective fields. The Interinstitutional Consortium for Indigenous Knowledge at Pennsylvania State University, for instance, is the, "the only currently active indigenous knowledge resource center located in the United States."[104] The National Institutes of Health is also leading national and international health sciences research institution and their interest in indigenous knowledge is extremely important in expanding conventional medical knowledge. The World Bank is one of two multilateral development institutions (the other is the United Nations), which have institutionalized and mainstreamed indigenous knowledge.

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[104] See http://www.ed.psu.edu/icik/ (Last accessed on February 21, 2008).

All three case studies have staff members qualified in the area of indigenous knowledge, have produced papers or documents on their work with indigenous knowledge, and have institutionalized these knowledge systems through databases and other methods of organization. In addition, all three case studies have websites with extensive information on their past and current activities or projects, links to indigenous knowledge resources, documents, and multimedia. Therefore, each case study provided me with sufficient data to study and analyze.

Within each case study I selected three key informants to interview. These informants discussed with me the origins of their program, past and current activities or projects, and future directions of the program. In addition, informants provided the opportunities and challenges that exist for indigenous knowledge in their respective case.

Using the purposeful sampling methodology in selecting key informants and key documents not only helped me in answering my research question, but the data I collected also allowed me to contribute to existing theories or literature on indigenous knowledge (Bogdan and Biklen, 2003). Furthermore, Mertens (1998) notes the sample of information chosen to study is directly related to the generalizability or transferability[105] of a study. Therefore, I made sure to interview key informants in each case study and study all key documents.

I also made sure that my sample (of interviews and documents) was diverse enough to include a variety of information and which helped me best illustrate the cases[106] (Creswell, 1998; Mertens, 1998; and Bogdan and Biklen, 2003). Bogdan and Biklen (2003) also write that it is acceptable to work with a small data set, for instance

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[105] Generalizability and Transferability are discussed in section *iv*.
[106] Mertens (1998) describes this technique as a "thick description."

key documents or a small group of people, which will give me best information to answer my research question. Therefore, I spent more time with informants as they provided more insightful information and were willing to share more relevant experiences.

2. Documents

Documents were also an important part of my data collection. Documents are important to understand a program's origin, goals, development, and future directions (Bogdan and Biklen, 2003 and Marshall and Rossman, 1999). Bogdan and Biklen (2003) write that documents are materials, which include personal documents (i.e. personal letters, emails, diaries, and official documents which are produced for the organization). Official documents include memos, newsletters, reports, and files. In addition, Marhsall and Rossman (1999) write that documents can objectively and accurately provide background information (i.e. start of the program, missions, and list of projects or activities) on the case study.

Example documents I studied in my three case studies include: books, chapters written for books, papers (refereed journal and conference proceedings), newsletters, and institutional documents (i.e. organizational policies). Before my interviews I made sure to read and review documents written by my informant. This gave me a better understanding of the informant's background and so I could focus on issue-specific questions in their area of expertise. I also asked my informants for recommendations on additional documents to review if I needed further written information on a concept they discuss.

I mainly focused on studying externally published official documents. If program staff members provided me relevant internal information, I referred to the external disclosure policies for each institution before using this information in my research. For example, the World Bank does not allow the use of internal documents to be used in externally conducted research studies. I was only able to use documents that are available on the Indigenous Knowledge Program's website and at the World Bank's InfoShop Book Store.

I also studied audiovisuals produced by each case study. I am including them in the document section as they were collected, stored, and analyzed similar to documents. The main audiovisual I plan to study is each case study's website which will include text, pictures, and perhaps videos. Each case study's website will helped me understand past and current projects or activities, collect additional documentation, and also see how each case study promotes indigenous knowledge. Information obtained from the website was printed and electronically stored on my computer.

3. Interviews

In addition to document analysis, I conducted one semi-structured interview (60-90 minutes each) with three key staff members in each case study. Conducting interviews allowed me to create a portrait of the individuals involved in each case study and their work experiences on indigenous knowledge.

Since I have worked in this field for the past two years, I recruited informants by networking with past employees. Each informant was also asked to sign a consent form

giving me permission to audio-tape the interviews and use their interview data in my research.

I used a formal interview process consisting of semi-structured questions. Semi-structured interviews are defined as, "interviews in which the same general questions or topics are brought up to each of the subjects involved" (Bogdan and Biklen, 2003 pg. 261). Although I asked key informants from all three case studies the same set of questions, I have also left enough safe for the informants to answer the questions in relation to their work in their respective case. This interview style allowed me to collect data on set topic areas from the informants, yet at the same time gave them opportunity to expand or elaborate on areas of their work specialty. In addition, this organization allowed me to compare and contrast data collected across the three case studies (Bogdan and Biklen, 2003) and determine whether the cases experience similar or different opportunities and challenges in their work with indigenous knowledge.

I divided my interview questions into five topic areas: a) Informants' background information; b) Information on the informants' work program; c) Definition of indigenous knowledge in the informants' case; d) Representation and institutionalization of indigenous knowledge in the informants' case; and e) the opportunities and challenges the informant feels indigenous knowledge face in their respective case.

The major issues indigenous knowledge face upon institutionalization in these fields, as I raised in the literature review are also explored in these interview questions. For example, in topic b, I asked the informants where their indigenous knowledge program or initiative is located. This will allow me to get a better understanding of whether organizational constraints may have impacted the program or initiatives' full

potential. Asking questions on these issues I developed also allowed me to understand how each case study is addressing a specific challenge. For example, if one of my cases is using a unique methodology to counter a challenge, the other cases may be interested in learning about this methodology in their institution.

I also left the last question open to ask the informant for general opportunities or challenges indigenous knowledge face in their respective case study. This allowed me to understand issues they faced with indigenous knowledge that go beyond those mentioned in the literature.

I also used "probing questions" to further my understanding of answers informants provide. Some examples of probing questions included, "What do you mean? Would you explain that? Give me an example. Take me through the experience" (Bogdan and Biklen, 2003). These type of probing questions allowed me to further understand what the informants' experiences are and also allowed them to elaborate on experiences they mention in brief.

In addition, Hatch (2002) recommends using language that is familiar to the informants and also respecting them and the answers they provide. Therefore, language of some questions was adjusted to the site of the case study. For example, the World Bank is a practice-oriented case, therefore, informants may not relate to academic terminology that I planned to use in interview questions with Pennsylvania State University informants. Also, vice-versa, Pennsylvania State University informants may not be familiar with terminology used for the World Bank informants.

The site of the interview was in the informants' respective place of work. If the informant was no longer working at their institution, other arrangements were made (i.e.

interviews were conducted their current offices). One telephone interview was conducted

with an informant living in Delhi, India.

During the interview, I asked informants to be seated across from me in a table

setting. I took notes during the interview, and with the permission of the informants, I

audio-tape recorded the interviews. After transcribing the audio-taped interviews, I asked

my informants to review the transcripts.

Transcripts were organized with headers indicating the informant, date, short

description about the informant (Bogdan and Biklen, 2003) and length of time of the

interview by noting the start time and end time (Marshall and Rossman, 1999). For

example:

Interview with Kate Bridges
Date: January 9, 1981
Kate Bridges agreed to let me interview her for my project. She is on sabbatical
    from the Vista City Elementary School this semester and is leaving for California
    in a little while. I invited her over for lunch and she enthusiastically accepted.
    She had a lot to say.
Start time: 2:00 pm
End time: 3:30 pm

Wolcott (1990) provides useful suggestions to use during interviews that I kept in

mind: talk little and listen a lot; record the informants' interview accurately (audiotape

interviews and transcribe information within one week of the interview); and be "candid"

so that you ask questions that answer your research question.

The following table details the type of data I collected and the objective of that data

collection.

Table 3.1 Summary of Data Collection Procedures

Data	Objective
Documents	To understand past and current projects or activities, events, and goals of the program. Examples include: books, chapters written for books, papers (refereed journal and conference proceedings), newsletters, and institutional documents (i.e. organizational policies).
Interviews	To understand participant perspectives and their work experience with indigenous knowledge. Interviews will be conducted with a minimum of three participants in each case study.
Audiovisuals	Primarily websites will be studied to retrieve further information on current projects or activities, documents, and other related information. In addition, websites will be studied to see how indigenous knowledge is promoted in its respective case study.

4. Validity, credibility, and generalizability

I ensured the validity and credibility of data by using triangulation, member checks, and peer reviews. In terms of triangulation, I used multiple sources of data (documents, interviews, and audiovisuals) to obtain a complete understanding of the case studies and made sure that my research question was answered through these multiple data sources (Maxwell, 1996 and Mertens, 1998).

I also used member checks by asking my informants to review the transcriptions of their interviews (Maxwell, 1996) and also sought feedback from other program

officials (whom I may not have interviewed) on other data I had collected. For example, I asked another program official to clarify information from a document.

To get a diversity of feedback, Maxwell (1996), Creswell (1996), and Mertens (1998) also suggest getting feedback from a variety of people (who I know) who may or may not be familiar with the case studies. This is known as peer reviews. A peer's feedback is considered to helpful because they can be direct with you, yet at the same time may sympathize with any hardships you are having in data collection or analysis processes (Guba and Lincoln, 1985 in Creswell, 1996). In addition, peer reviewers may spend extended time with you to discuss your topic (Mertens, 1998). Therefore, after completing final drafts of my reports, I asked peers in my doctoral program to review my analyses to help me challenge my thought processes on my data analysis.

In addition to validity and credibility, I made sure that the data I collected is transferable to other relevant studies or settings. This is known as generalizability (Bogdan and Biklen, 2003) or transferability (Mertens, 1998). One way to test generalizability or transferability of data is to compare data collected to other studies that are asking similar research questions (Bogdan and Biklen, 2003). Bogdan and Biklen (2003) write that this can allows researchers to, "establish the representativeness of what they have found…[or] to show the non-idiosyncratic nature of their own work" (Bogdan and Biklen, 2003 pg. 32).

Mertens (1998) writes that another way to test generalizability or transferability of data is to provide a thick description or "careful description of the time, place, context, and culture" (Mertens, 1998 pg. 183) of the case studies. Providing enough detail or information about the case studies can allow me, or others who are reading my research,

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to make connections to other studies, settings, or even general theories on indigenous knowledge. Instead of comparing data to another case or setting, this method asks the researcher to reflect on the data they have collected and make generalizations (Bogdan and Biklen, 2003). Therefore, generalizability or transferability allows researchers to determine whether the data they collected is applicable to another study or setting.

5. Assumptions and biases

Maxwell (1996) notes that a researcher should acknowledge their theories, preconceptions, or values about the topic before beginning their research study. He writes that it is necessary to understand how a researcher's value and interests may influence how a study is conducted, how the data is analyzed, and any conclusions that are made.

I did acknowledge that I may have assumptions or biases about one of the programs before I started my research. I worked with the Indigenous Knowledge program at the World Bank for ten months as an intern and participated in a number of projects or activities in their headquarters office. I also contributed three written documents – two "IK Notes" (their monthly newsletter publication) and a literature review on the scientific validation of indigenous medicines as a material for a distance-learning course. Following the internship with the program, I held another internship in another department at the World Bank for one year. In addition, my colleague and I have written an article about the Indigenous Knowledge program describing its main projects or activities and functions and have theorized challenges indigenous knowledge face in

international development. I also know people in the program and at the World Bank - many of whom are close colleagues and friends.

I am aware of the internal challenges the program faced and the frustration staff working in the program have encountered. I know that despite the awareness that the program brought to indigenous knowledge, other staff members in the institution have either not heard of the program or felt very hesitant in using this knowledge in their work programs as it was not validated to conventional knowledge standards.   Therefore, I may be biased about organizational policies, procedures, and structures that have limited the program's activity.

Therefore, another technique that I used during my research is documenting my own changing perspectives or "constructions of the research" (Mertens, 1998 pg. 182). This is known as progressive subjectivity (Mertens, 1998). I have noted my initial biases, and therefore, included more reflections of my work experience as I analyzed data from the World Bank case study. In my research process, I observed whether my biases changed or if they remained the same. This gave me some objectivity to my research and allowed me to understand whether the assumptions I had at the beginning of the study influenced my research and data collection.

I was not aware of any biases for the other two case studies as I have not worked with them. I had only read about them through externally published documents and studied their websites.

6. Analysis

In this section, I detail how I recorded, managed, and analyzed my data. Since I collected data from each case study one at a time, I analyzed each case study independently and then did a comparative analysis of the three cases.

Over the past twenty years, qualitative data analysis software has become popular, advanced, and frequently used for large research projects (Creswell, 1998). Bogdan and Biklen (2003) write that qualitative data analysis software makes data analysis efficient as researchers can easily code data in multiple ways and compare data across multiple themes. For example, when I collected data that could be coded as both scientific validation and validation process for development work, then these two codes were compared with one another and also analyzed separately. Creswell (1998) also agrees with Bogdan and Biklen (2003) by writing that qualitative data analysis programs easily allow researchers to code data, are good "text retrievers," (Creswell, 1998 pg. 157) and also can help create conceptual diagrams based on the codes developed. I used the qualitative data analysis software *NVivo* to organize, store, code, and retrieve data.[107]

In terms of management of data, since data was collected in the form of documents, interviews, and audiovisuals, each was recorded in a different manner. Interviews were audio-taped and documents and audiovisuals were retrieved from the respective organization or from their website. All data collected were managed through use of a file organization or files created on my computer and through *NVivo*. For example, documents analyzed or transcriptions, which are transcribed, were stored in appropriately labeled electronic files. File names included the type of file (interview

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[107] *Nvivo* was also highly recommended by faculty and students in my graduate program.

transcript, document, or audiovisuals), case study cite, name of informant or document, and date.

Sample File Name Structure:

interview_transcript_Penn_State_John_Smith _5.1.07.

In terms of analysis, since I planned to study each case study independently, I began the data analysis process in increments, as opposed to towards the end of my data collection (Maxwell 1996; Bogdan and Biklen, 2003). For example, I transcribed interviews within one week of the actual interview. This process made data collection more manageable and a coherent process. In addition, as I analyzed my data, I was able to "eye-ball" (Bogdan and Biklen, 2003 pg. 172) or review the small amounts of data I have collected for codes and initial patterns. Based on this initial analysis, I modified questions for subsequent interviews and collected more documents or audiovisuals to better answer my research question.

After data was recorded and managed, I coded my data related to the issues I mentioned in my literature review. Although *NVivo* helped me in this process, I coded data according to what helped me best identify it. Marshall and Rossman (1998) recommend coding data in the form key words, symbols, or colors. Bogdan and Biklen (2003) recommend using abbreviations or units so that data is easily accessible and can be related to each other. Both believe that coding helps the researcher organize data so that they can develop a plan to analyze the data. I used key words to code my data.

After data was coded, Marshall and Rossman (1999) and Shank (2002) recommended finding important themes or patterns, such as frequently appearing language or descriptions, which may link data collected in the case study. Once again I used *NVivo* to do this.

Bogdan and Bogdan (2003) describe a method I used to further analyze the data that are grouped into themes or patterns. The modified analytic induction process involves comparing coded data to known theories in the literature. This process allowed me to see how I contributed to existing theories or provided alternative theoretical frameworks to the topic of indigenous knowledge.

After individual case study data was managed and analyzed, I began comparing data across the case studies. I did this by first comparing and contrasting the coded data across the cases. Following this, I compared themes developed for each case study across the cases. Comparing data across case studies allowed me to make better generalizations about the data and transferability to other studies or settings. Finally, Marshall and Rossman (1999) suggest looking at data for usefulness and centrality to determine how useful the data is in answering my research question. I did this to determine whether my data answered my research question.

In conclusion, this study used a multi-case study methodology to study three institutions that mainstreamed or institutionalized indigenous knowledge. Data was collected in the form of documents, interviews, and audiovisuals. Findings were written after data was analyzed.

IV. National Institutes of Health

A. Introduction

In the movie "Medicine Man" Sean Connery plays a research scientist who discovers an indigenous medicine that cures cancer. He faces many challenges in sharing this medicine to the Western scientific community including providing sufficient validation evidence, producing sufficient quantity of the drug, and making sure the local traditional healer is acknowledged. Although "Medicine Man" is a Hollywood movie and does depict stereotypical images of indigenous peoples and Western scientists, Sean Connery's work in the movie resembles the work of scientists in the Natural Products at the National Institutes of Health (NIH). When I sat down with Gordon Cragg, former chief of the Natural Products Branch, for an interview he asked me if I had seen "Medicine Man." He told me that his work at the NIH is actually very similar to this Hollywood movie.

In this chapter, I investigate the first case study - the Natural Products Branch, located in the NCI, at the NIH. Below is a presentation of the Natural Products Branch's main activities, opportunities the program creates for indigenous medicines at the NIH, challenges indigenous medicines face at the NIH, and the future directions of the program. In addition, a background to the NIH and NCI (where the Natural Products Branch is located) is detailed.

It is also important to clarify that the term indigenous is not used at the NIH, but rather the institute uses alternative medicines, natural products, or traditional medicines. To be consistent with the NIH, I have used the terms alternative medicines or natural products when referring to indigenous medicines in this chapter.

B. Background

This section showcases the history of the institute and department the case study is housed in and includes: 1) the history of the National Institutes of Health; 2) The National Cancer Institute; and 3) The rationale for studying the National Products Branch.

1. History of the National Institutes of Health

The National Institutes of Health (NIH) was founded in 1887 and they refer to themselves as, "a global leader" for medical research in the United States. NIH's main campus is located in Bethesda, Maryland, however, they also have offices throughout the U.S. and globally. For example, the NIH has research facilities in Rockville, Fort Detrick, and Frederick Maryland, and a research facility located in the Research Triangle Park (RTP) in North Carolina.

NIH's goal is to research and acquire "new knowledge to help prevent, detect, diagnose, and treat disease and disability, from the rarest genetic disorder to the common cold" and the organization's mission is to "uncover new knowledge that will lead to better health for everyone."[108] NIH's current director is Elias A. Zerhouni, M.D. who oversees the institution's 27 Institutes and Centers, its approximately 18,000 employees, and their fiscal year (2006) budget of $28.6 billion[109],[110].

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[108] See www.nih.gov (last accessed on February 21, 2008)
[109] For the fiscal year 2006
[110] See www.nih.gov (last accessed on February 21, 2008)

The NIH, supported by the U.S. government, is one of eight health agencies within the U.S. Department of Health and Human Services.[111] Activities at the NIH are divided into intramural and extramural activities. The NIH conducts extramural activities by providing grants and financial support to medical research occurring outside the NIH, such as to "non-Federal scientists in universities, medical schools, hospitals, and research institutions throughout the country and abroad; helping in the training of research investigators; and fostering communication of medical and health sciences information."[112]

2. National Cancer Institute

The National Cancer Institute (NCI), one of the 27 institutes at the NIH, was established in 1937 and "conducts and supports research, training, health information dissemination, and other programs with respect to the cause, diagnosis, prevention, and treatment of cancer, rehabilitation, and the continuing care of cancer patients."[113]

NCI has approximately 5,000 employees whose work is also divided into intramural and extramural activities. Their intramural activities include basic bench work (drug discovery), clinical work, and epidemiological research. Extramurally they support research conducted at universities, teaching hospitals, and other organizations. Within their extramural program, NCI also offers U.S. based scientists researching cancer services such as: "tissue samples, statistics on cancer incidence and mortality, bioinformatic tools for analyzing data, databases of genetic information, and resources

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[111] U.S. tax dollars also support medical research at the NIH which is over $28 billion dollars. See www.nih.gov (last accessed on February 21, 2008)

[112] See www.nih.gov (Last accessed on February 21, 2008)

[113] See http://dtp.nci.nih.gov/branches/npb/index.html (Last accessed on February 21, 2008)

through NCI-supported Cancer Centers, Centers of Research Excellence, and the Mouse

Models of Human Cancer Consortium."[114]   Almost every state in the US conducts cancer

research using NCI funding and at the international level NCI supports cancer research in

more than 20 countries.[115]

3. Rationale for studying Natural Products Branch

I was introduced to the NIH's Natural Products Branch when I was doing an

internship with the Indigenous Knowledge Program at the World Bank. Dr. Gordon

Cragg, one of my informants in this case study, participated in a distance learning course

the Indigenous Knowledge Program at the World Bank organized. The Natural Products

Branch's work is of interest to the World Bank as their researchers investigate natural

products, many of which have been identified as indigenous, traditional or alternative

medicines, and develop protocols to screen and validate these medicines. I had a chance

to meet him at that time, and share with him my own research interests.

The Natural Products Branch is also an intramural activity at the NIH hence they

support in-house research. Therefore, in studying the program I was able to understand

how alternative medicines are identified, validated, and institutionalized at the NIH and

also determine how alternative medicines are represented at the NIH.

Another program at the NIH works with alternative medicines -- the National

Center for Complementary and Alternative Medicine (NCCAM).[116]   NCAAM is an

extramural program and mainly funds research on alternative medicines in institutions

throughout the U.S. and globally. Initially Cragg says that the, "NIH was very reluctant

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[114] See http://www.cancer.gov/ (Last accessed on February 21, 2008)
[115] See http://www.cancer.gov/ (Last accessed on February 21, 2008)
[116] This program also has a division in the NCI.

to be involved [in this program] at that stage [1992 and 1993] anyhow there was the…bias from medical community that this is all voodoo and magic and you know black magic sort of stuff and we're not getting involved in this" (Gordon Cragg, personal communication, May 23, 2007). Gradually scientific evidence and research validated some alternative medicines and Cragg notes that then less resistance was shown from the medical community.

Research institutions or organizations working with alternative medicines submit proposals to the NCCAM office and they are then reviewed by their branch's scientists (holding Ph.Ds and MDs). For example, a homeopathic clinic in India has asked the NCI to financially support their work in the treatment of lung cancer. The Office of Cancer Complementary and Alternative is currently "investigating" this case study and re-validating their work before deciding to fund it.

I have studied both programs, but focus on the Natural Products Branch. In do this in part because they conduct scientific validations, institutionalize natural products or alternative medicines into NIH medical databases, and also influence which drugs are approved by the FDA and mass produced.

To gain a better understanding of these processes at the NIH, I interviewed three informants in this case study: Dr. Gordon Cragg (Cragg), Dr. A. Hammed Khan (Khan), and Dr. Jeffrey White (White).

Cragg, who received a Ph.D. in Organic Chemistry from Oxford, served as the chief of the Natural Products Branch at the NIH. He recently retired and now serves as a special volunteer. His major interests lie in the discovery of

novel natural product agents for the treatment of cancer and AIDS, with an emphasis on multidisciplinary and international collaboration. He has published over 140 papers related to these research interests. He was awarded the NIH Merit Award for his contributions to the development of taxol (1991). The Missouri Botanical Garden recently discovered a Madagascar plant and named it in his honor, *Ludia craggiana*.

Khan is a Health Science Administrator in the Division of Scientific Review, National Institute of Child Health and Human Development. Khan came to NIH on a Fogarty International Visiting Fellowship Award from the Royal Cancer Hospital, a post-graduate medical center of the University of London, England. He worked on a ten year project to discover drugs that deactivate genes causing cancer. At NCI, Dr. Khan conducted over 500 experiments which resulted in 200 novel active drugs and 45 patented by the US Government. One of them is AZQ used for treating brain cancer. He received the NIH Scientific Achievement Award for his discovery of the AZQ drug.

White received an M.D. from Howard Medical School and currently serves as the director of the National Cancer Institute's Office of Alternative and Complementary Medicine. As the director he works with the NIH's cancer advisory panel, consisting of oncologists, research nurses, alternative medicine practitioners, and FDA staff. He also bridges communication between the alternative medicine community and NIH scientists.

C. Natural Products Division

This section presents the history and development of the case study, the Natural Products Branch, and discusses the following: 1) History; 2) Mission; and the 3) Main Activities.

1. History

During the 1950s, Western medical scientists discovered two plant-derived antileukemic agents[117] and this prompted the NCI to collaborate with the Department of Agriculture to investigate plants for anti-tumor activity. Thereafter, the Natural Products Program, located within the NCI, began in 1960, to discover novel and naturally derived agents to treat cancer and AIDS. Since then, the program has collected over 35,000 plant samples, and researchers have tested over 114,000 plant extracts and over 18, 000 marine organism extracts have also been tested for anti-tumor activity.[118],[119] Although plant derived agents such as Taxol and camptothecin were important discoveries by this branch, NCI discontinued the natural products collections in 1982 as only a few natural products proved useful for humans.

In September 1986, however, the programs started up again because new screening techniques for plant derived drugs were developed. At this time the Natural Products Branch expanded its collection of plants to more tropical and subtropical regions and of marine organisms in the Indo-Pacific region. In 1988 the NCI also initiated a program to find natural products for the treatment of AIDS.

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[117] The agents were vinblastine and vincristine, and isolated podophyllotoxin, which were modified by a pharmaceutical company to the clinically useful anticancer agents, etoposide and teniposide (Natural Products Drug Discovery and Development program, 2002).

[118] See http://dtp.nci.nih.gov/branches/npb/index.html (Last accessed on February 21, 2008)

[119] Throughout the initiation of the program NCI has collaborated closely with the pharmaceutical industries to test over 180,000 microbial extracts (Natural Products Drug Discovery and Development program, 2002).

Currently, the Natural Products Branch, which is responsible for drug discovery and pre-clinical development of drugs, is located in the Developmental Therapeutics Program (DTP), in the NCI (Cragg, 2007).

2. Mission

The primary responsibility of the Natural Products Branch is in collecting natural product materials from terrestrial and marine environments. These natural products are extracted, screened, and tested on NCI cancer cell lines.[120] Cragg says that the program is unique as it acknowledges that, "well over 60% of the cancer drugs…are in one way or another connected with natural products" (Cragg Gordon, personal communication, May 23, 2007) and points out that, thus far, natural products have proved to be superior to drugs that are synthetically produced. An example is the cholesterol lowering drug Lipitor that is based off of a fungal-derived chemical.

In addition, White says that this area is important to the NIH medical research community and that many scientists have become interested in looking at, "what components are in it [alternative medicine]? What kind of activity it might have and in some kind of animal model that can help us ultimately learn something about its mechanism of action…?" (Jeffrey White, personal communication, June 18, 2007).

3. Main Activities

The Natural Products Branch's activities can be divided into three main areas: a) collection of materials (plants and microorganisms); b) Drug Discovery and

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[120] Located at the Frederick Cancer Research and Development Center [FCRDC].

Development; c) Maintenance of repository programs; and d) Collaborations. These main activities lead to the institutionalization[121] of natural products at the NIH.

a. Collection of natural products

The Natural Products Branch's initial focus was collecting tropical plants, however, since the 1990s their focus has also included marine organisms (Zagorski, 2004). Cragg notes that this is important because bacteria are resistant to extreme environments and therefore, "novel bacteria can be found at the bottom of a polluted lake, or even in the middle of a toxic waste dump" (Cragg Gordon, personal communication, May 23, 2007). This creates more opportunities for collections of natural products in many diverse areas and environments.

The program collects natural products in the following method. Contractors carry out plant collections in a specific collection region they are assigned to. For example, the University of Illinois at Chicago obtains samples from Southeast Asia, the Missouri Botanical Garden is responsible for collecting in Africa and the Morton Arboretum in Lisle, Illinois, collects samples from the continental United States.[122],[123] Samples from Central and South America are directly obtained through collaborations with research organizations in the region.[124] Collections are usually carried out through collaborations with local research institutions.

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[121] As discussed in chapter 1, in this research study the institutionalization of indigenous knowledge refers to embedding indigenous knowledge into an organization's structure (i.e. policies, programs, or infrastructures such as databases). Eventually the institutionalization of indigenous knowledge facilitates indigenous knowledge to become a permanent part of the organization and allows it to better integrate indigenous knowledge into the existing infrastructures, programs, or policies.
[122] See http://dtp.nci.nih.gov/branches/npb/index.html (Last accessed on February 21, 2008)
[123] The New York Botanical Garden from Central and South America were initially collected samples from 1986 to 1996.
[124] See http://dtp.nci.nih.gov/branches/npb/index.html (Last accessed on February 21, 2008)

Additionally, five hundred samples are collected by each of the contractors operating in Southeast Asia and Africa, and a 1000 samples are collected annually by the Morton Arboretum in the United States[125]. Each collected sample is generally between 0.30 and 1 kilogram (kg) in dry weight and are collected with different plant parts (bark, roots, leaves, fruits).[126] Contractors are required to submit detailed documentation for each collected sample. For example, they are required to provide the taxonomy, plant part, date and location of collection, habitat, and, if possible, any traditional medicinal uses and methods of preparation used by local peoples.[127]

In addition, the Coral Reef Research Foundation in the Indo-Pacific region collects marine organisms. About 700 samples (between 0.5 and 1 kg) are collected each year, and documented by the program.[128] Samples are frozen until they are extracted and tested in cancer cell lines.

The collectors also present a letter of collection, called the Material Transfer Agreement, to the countries officials to make sure countries are acknowledged for their country's natural products. For instance, Cragg says that through the:

letter of collection…contractors, who are doing, our collecting for us, would always present to authorities in each country and…NCI always assured the countries that even if they didn't formally sign the agreement this was, as far as NCI was concerned…if we discovered any…promising drug from the plant collected in their country, even though there wasn't any agreement, there would be proper benefit sharing, training, and technology transfer (Gordon Cragg, personal communication, May 23, 2007).

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[125] See http://dtp.nci.nih.gov/branches/npb/index.html (Last accessed on February 21, 2008)
[126] See http://dtp.nci.nih.gov/branches/npb/index.html (Last accessed on February 21, 2008)
[127] See http://dtp.nci.nih.gov/branches/npb/index.html (Last accessed on February 21, 2008)
[128] See http://dtp.nci.nih.gov/branches/npb/index.html (Last accessed on February 21, 2008)

Therefore, the Natural Products Branch claims that they always gave credit back, through benefit-sharing, to the countries from which the collection occurred.[129]

b. Drug discoveries and development

Once a sample is collected, it is sent to the Natural Products Repository (NPR) at the Frederick Cancer Research and Development Center (FCRDC) in Frederick, Maryland. There, the sample is stored "in a low temperature minus 220 degree C repository in Fredrick in the NCI facility" (Gordon Cragg, personal communication, May 23, 2007) until extraction or further investigation.[130] Cragg adds that:

since that 1986 to now probably collected, on the order about, I think that there are 50 to 60 thousand plants. Which probably represent about 15, 000 different plant species. Cause you know from each plant you can collect different parts….you can collect their roots, and the leaves…and the fruit, and so forth (Gordon Cragg, personal communication, May 23, 2007).

For further investigation of the frozen specimens are brought to the extraction laboratory where they are broken down with a methanol/dichloromethane mixture and water (for plants) or in a large meat grinder (for marine organisms). The sample then is extracted with a methanol/dichloromethane mixture to provide an organic extract.[131]

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[129] My informants at the NIH did not discuss the topic intellectual property rights. They mentioned that through benefit-sharing the countries from which the samples were collected received credit and also any technical assistance from the NIH (in terms of research facility development, etc.). NIH scientists, if they discovered a novel compound from the traditional medicine, were allowed to patent it. However, local traditional healers were not involved in this process. In some patent cases, the name of the traditional plant, location, or other cultural reference is used in naming the new "novel" medicine.

[130] In addition, upon collection, a sample is assigned a unique NCI collection number, expressed in the form of a barcode label, and five voucher specimens of each product are prepared. One is donated to the national herbarium or marine organism depository in the country of collection, and another is sent to the Smithsonian Institution's Museum of Natural History in Washington, D.C. See http://dtp.nci.nih.gov/branches/npb/index.html (Last accessed on February 21, 2008).

[131] See http://dtp.nci.nih.gov/branches/npb/index.html (Last accessed on February 21, 2008)

Once the samples are extracted, they are tested for selective cytotoxicity[132] against panels of human cancer cell lines—including leukemia, lung, colon, central nervous system, melanoma, ovarian, breast, prostate, and renal cancers (Natural Products Drug Discovery and Development Program, 2002). This process is called screening.

Chemists in the Natural Products Branch then isolate the active chemicals and determine their structures. Discovery of novel active chemicals, which fight cancer, are suggested for research at the preclinical development research.[133] Therefore, drug discovery and development is divided into collection of species, extraction of chemical compounds, screening against cancer cell lines, and then the isolation of chemical compounds.

c. Repository Programs

The NCI has also created a Natural Products Repository (NPR), which the NCI calls a, "unique and valuable resource for the discovery of potential new drugs and other bioactive agents."[134] The NCI Natural Products Repository currently houses around 170,000 extracts from samples of over 70,000 plant and 10,000 marine organisms collected from over 25 countries, as well as over 30,000 extracts of diverse bacteria and fungi (Zagorski, 2004). This repository is being considered as a source of novel compounds to add to the 500,000 compounds in the NIH Roadmap Molecular Library (Zagorski, 2004). Cragg adds that, "these extracts [in the repository] are available to any group world-wide…to test any human disease…" (Cragg Gordon, personal communication, May 23, 2007).

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[132] The quality of being toxic to cells.
[133] See http://dtp.nci.nih.gov/branches/npb/index.html (Last accessed on February 21, 2008)
[134] See http://www.cancer.gov/ (Last accessed on February 21, 2008)

Since 1997, extracts showing significant activity in the NCI human cancer cell line screens have been made available, through the Active Repository Program, to other cancer research organizations. The organizations must follow the Material Transfer Agreement protecting the rights of the countries from which the natural products were collected (Zagorski, 2004) and they must submit a proposal of their research project to be approved by the Active Repository Program.

Since these collected natural products can lead to the discovery of new drugs, the NCI has developed policies to distribute these extracts to various organizations, in fields outside of cancer research, such as AIDS, and related opportunitistic infections, and diseases that are prevalent in developing countries (i.e. malaria, parasitic diseases). This is done in part for natural products to be further studied. Organizations only need to pay a nominal fee for shipping and handling of natural products.[135] This aspect of the program was developed in 1999 so that other organizations could test the natural products against a variety of human diseases.

d. Collaborations

i. Collaborations with source countries

Contractors hired by the NCI work with the appropriate organizations in each of the source countries to carry out collections of plants and marine organisms. Source country organizations provide facilities for the preparation, packaging, and shipment of collected samples to the NCI's Natural Products Repository (NPR) in Frederick,

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[135] Organizations must sign a legally-binding Material Transfer Agreement (MTA), which protects the rights of all parties, particularly those of the countries of origin of the natural source materials (plants and marine organisms).

Maryland. In return, NCI provides the source countries support for research activities. Cragg says that the Natural Products Branch:

still have a very good agreement in Pakistan, in fact, the University of Karachi…we would assist these organizations in establishing their own screenings, in country so that they could collect their materials, plants, or whatever, make chemical extracts of them, test the extracts for in screens…the screens were cancer cell lines for in-vitro cell cure or growth inhibition and…we [also] got a couple in Brazil which are doing well (Gordon Cragg, personal communication, May 23, 2007). NCI contractors also hold training workshops on NIH scientific techniques for local scientists and collectors.

Exchanges also exist between scientists. The Letter of Collection allows source country scientists to visit the NCI or other research organizations in the U.S. to collaborate on research and projects. The Letter of Collection also dictates terms of benefit-sharing in drug discovery. Cragg adds:

we had these collections in about 30 different countries and in fact even before the…signing of the convention on biological diversity in Rio de Janeiro in 1992, NCI had established agreements for collaboration and….benefit sharing with the countries who we were working with (Gordon Cragg, personal communication, May 23, 2007).

Currently the Natural Products Branch is not using contracts and more direct connections are being made with the appropriate organizations in the source countries.

ii. Collaborations within NIH

The Natural Products Branch also has collaborations within the NIH. For example, NCI's Natural Products Branch worked on treatments for HIV/AIDS within the Infectious Diseases Institute. Cragg tells me that, "at the start of the AIDS sort of

epidemic, pandemic…NCI is the only institute at the NIH…which has a sophisticated drug development and discovery program" (Gordon Cragg, personal communication, May 23, 2007) and their program was used to test and develop various drugs for HIV/AIDS.[136] Therefore, in this process natural products were also screened or tested against HIV/AIDS infected cells.

Natural Products Branch members also serve as NCI representatives on the coordinating committees of National Cooperative Natural Product Drug Discovery Group [NCNPDDG] and International Cooperative Biodiversity Group [ICBG] consortia (Natural Products Branch, 2002).[137]

Table 4.1: Example collaborative programs in the Natural Products Branch, NIH
(source: Natural Products Drug Discovery and Development Program website; see http://dtp.nci.nih.gov/branches/npb/index.html (last accessed February 21, 2008))

Name	Location	Purpose
The South American Organization for Anticancer Drug Development (SOAD)	Porto Alegre, Fundacao Oswaldo Cruz-FIOCRUZ in Rio de Janeiro and the University of Paulista	Investigates Plants in Brazil
The Kumming Institute of Botany	China	Researches Chinese medicinal plants
The Korean Research Institute of Chemical Technology	Korea	Researches Korean medicinal plants
The H.E.J. Institute of Chemistry	University of Karachi, Pakistan	Researches Pakistani plants
The University of Dhaka	Bangladesh	Studies Plants and microbes
Brigham Young University	Dr. Paul Cox, University of Utah	Researches Polynesian medicinal plants
Tel Aviv University	Israel	Studies Red Sea marine invertebrates

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[136] Collaboration

s with other institutes (researching other diseases) was limited as they did not need to use the natural products branch.

[137] Other programs at the NIH, which are involved in biodiversity projects, international programs, and work with developing countries.

The New Zealand National Institute of Water and Atmospheric Research	New Zealand	Studies marine organisms
The Cancer Research Center at the Russian Academy of Medical Sciences	Moscow, Russia	Studies Russian medicinal plants
The Zimbabwe National Traditional Healers Association	Zimbabwe	Studies Zimbabwean medicinal plants

D. What is considered indigenous knowledge at the NIH – nomenclature and definitions

1. Nomenclature

The NIH does not use the term "indigenous" to describe medical forms outside of conventional medicine, but rather they use the following terms interchangeably:

- "natural products"[138]

- "traditional" (A. Hammed Khan, personal communication, May 25, 2007);

- "herbal" (Gordon Cragg, personal communication, May 23, 2007; A. Hammed Khan, personal communication, May 25, 2007);

- "complementary and alternative"[139] (Gordon Cragg, personal communication, May 23, 2007; Jeffrey White, personal communication, June 18, 2007); and

- "ethno-medicine"[140] (Gordon Cragg, personal communication, May 23, 2007).

White says that if indigenous was used at the NIH, it would probably, "map mostly to alternative medical systems…" (Jeffrey White, personal communication, June 18, 2007) and that there is no difference in the meaning between the terminology.

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[138] See www.nih.gov (Last accessed on February 21, 2008) and
http://dtp.nci.nih.gov/branches/npb/index.html (Last accessed on February 21, 2008)
[139] See http://nccam.nih.gov/ (Last accessed on February 21, 2008)
[140] Cragg mentioned that many medical conferences prefer to use the term "ethno-medicine" to describe medical knowledge outside the conventional medicine.

Since the NIH, however, formally labels programs outside of conventional medicines as "Natural Products" and "Alternative and Complementary," below I showcase how these terms are defined.

2. Definition

Cragg says that Natural Products are defined as, "the actual chemical…a natural product but it's a single chemical entity" (Gordon Cragg, personal communication, May 23, 2007). For example, Cragg discussed with me that Taxol, medicine used for cancer treatment, is a chemical isolated from the Pacific Yew tree, therefore, it is considered as derived from a natural product. Natural products can become mainstreamed or considered conventional after they are scientifically validated. He refers to herbal products as, "products that are extracted from a whole plant" (Gordon Cragg, personal communication, May 23, 2007).

The NIH recognizes complementary and alternative medicines to include, "alternative medical systems [that] are built upon complete systems of theory and practice" (Office of Cancer Complementary and Alternative Medicine, 2005). They also acknowledge that these evolved outside of conventional medicine and in some cases may have formed before conventional medicines.

White says that the NIH:

defined alternative and complementary medicines in fairly broad ways for the institute. The NIH…[has made a] homogeneous a definition of Complementary and Alternative Medicine (CAM), ah, across all of its institutes (Jeffrey White, personal communication, June 18, 2007).

Therefore, he notes:

eight categories of complementary and alternative medicine [were developed for] the NCI's portfolio [so that even] a particular dietary approach let's say, [even] vitamin C, which is a good example…high doses of vitamin C have been used by CAM [Complementary and Alternative Medicines] practitioners…we would probably capture that under here… (Jeffrey White, personal communication, June 18, 2007).

They also acknowledge the following as alternative medical systems and are supporting research to validate these systems of medicine: Energy Therapies[141] (involving the use of energy fields and the human body), Exercise Therapies (T'ai chi, yoga asanas), Manipulative and Body-Based Methods (the body such as chiropractic and therapeutic massage), Mind-body interventions (to enhance the mind's capacity to impact bodily function and symptoms such as meditation and hypnosis), Nutritional therapeutics (use of nutrients and non-nutrients, bioactive food components that are used as chemo-preventive agents, and the use of specific foods or diets, i.e. being vegetarian for prevention of certain diseases), Pharmacological and biologic treatments (biological interventions not yet validated or used in conventional medicine such as products from honey bees and shark cartilage), Spiritual Therapies (such as intercessory prayer and spiritual healing) (Office of Cancer Complementary and Alternative Medicine, 2005).

White, however, does acknowledge that there is a difference between "folk medicine" and "structured medicine" within the alternative medicine framework. He says that:

folk medicine [is considered as the] common person's approach to medicine. Like we have in the United States even, and all the, lots of countries, there's sort of what you might call…what your grandparents might have done for you, they're not trained in any specific medicine, but…have developed a folk experience of the use of certain herbs or

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[141] NIH notes that medical techniques such as Energy Therapies are not scientifically sound or validated (NCI's Annual Report on Alternative and Complementary Medicine, 2005).

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whatever…that might have come out of a structured medical system like Ayurveda… (Jeffrey White, personal communication, June 18, 2007).

Therefore, the forms of alternative medicine the NIH is interested researching and validating are well documented, such as Ayurveda and Traditional Chinese Medicine.[142] Once these alternative medicines are validated, or reduced to single chemical compounds, they become mainstreamed and can be considered a part of conventional medicine. The main difference between these medical systems and a synthetic compound is that alternative medicine is derived from a natural source.

Despite these extensive descriptions and categorizing these medical systems into alternative medicines, Cragg (2007) mentions that "there is a lot of confusion I think out there…" regarding nomenclature. He says that the many people associate, "the term natural product [to] a herbal product…which in a way it is but [natural product is] a single chemical isolated from the herbal, its not the sort of herbal tea or extract…"

Khan says that there should not be any, "difference in medicines outside conventional systems, [in terms of nomenclature], except [in] the difference of the [environmental] climate" (A. Hammed Khan, personal communication, May 25, 2007) where the medicines are found.[143] Ideally this would be nice, however, it does not acknowledge medical forms oppressed or dominated by the conventional medical paradigm. Cragg, therefore, believes that complementary may be the best term to equally recognize alternative kinds of medicine. He tells me, "I say come on there's sort of

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[142] As opposed to medical knowledge passed down orally through generations
[143] Furthermore, Khan believes that no distinction should be made between groups of people who have knowledge of alternative medicines and says that, "there is only one race, [the] human race…" (A. Hammed Khan, personal communication, May 25, 2007). He reminded me that our mitochondrial DNA has evolved from one woman, "a black woman, who was born in Africa 3 million years ago…" …" (A. Hammed Khan, personal communication, May 25, 2007). Furthermore, the NIH only uses the term Indigenous Peoples as defined or used by the United Nations.

wonderful aspects of both systems and that's why I like the term complementary…"
(Gordon Cragg, personal communication, May 23, 2007), because alternative medicines
can be used in conjunction with conventional medicines to enhance them or help a patient
where a conventional medicine is lacking.

E. Processes involved in the institutionalization

Before a natural product is institutionalized at the NIH, it goes through a rigorous
validation process, based on the Western scientific method.   Below I showcase the
Western validation technique (1) and the indigenous validation techniques the NIH uses
(2).

1. Validation

The NIH has very extensive validation processes for both conventional and
alternative medicines before they are institutionalized at the NIH.   Institutionalization at
the NIH means validating a drug for the U.S. market, creating a patent for the drug, and
institutionalizing it in the NIH's medical databases and library.

Khan tells me that the validation process, "is a very complex process [and can
take] almost seven years" (A. Hammed Khan, personal communication, May 25, 2007).
Khan says that the validation procedure starts with:

a microbial screening, called AMES test[144]…and then we go to the ninety day toxicity
study in animal to see how toxic it is, what are the safe dosage level. From there it goes
to another test it called…the two year toxicity test. Intensely it is this long term toxicity
test is done to make sure it does not cause mutation and various kind of cancer in old age
animals. And then from there on you go to the immunological testing to say it's not
immunological harmful.   From there it goes to the phase I clinical trial…where

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[144] During this time, isolated chemicals are also validated against cancer cell lines that the NCI has grown
and maintained.

30…people are used. From there it goes to phase II clinical trial where 300 people are used. From there it goes to 3000 people in different parts of the world called phase III clinical trial (A. Hammed Khan, personal communication, May 25, 2007).

Cragg adds that:

after they've gone through all animal toxicity and so forth…then if it goes through all these clinical studies and its proven to be efficacious then they get the NDA which is the New Drug Application which then [the drug] is commercially approved for commercial use by the FDA…(Gordon Cragg, personal communication, May 23, 2007).

The same validation procedures are applied to both conventional and alternative forms of medicine. For alternative medicines, Cragg says:

its important that the [validation] and…I sound sort of snobbish and everything, but that good science is applied to a lot of these products…I think its good to, you know, bring our scientific sort of basic knowledge now and apply it to that (Gordon Cragg, personal communication, May 23, 2007).

White adds:

you may not know what the right dose is, [for alternative medicines] you may know the doses that you use, but you may not know the appropriate, you know, the best dose would be so, it still does make sense to do dose escalation studies and probably within some range. And you still may not know a whole lot about the toxicity…based on these selective cases (Jeffrey White, personal communication, May 25, 2007).

Cragg also notes that "when you isolate a pure chemical, you know what you've

got," (Gordon Cragg, personal communication, May 23, 2007), however, when you have

an entire plant you do not know which chemical is responsible for the action of the plant,

because as Cragg says even in one area, "two trees of the same species a few hundred

yards apart can vary widely in their chemical content" (Gordon Cragg, personal

communication, May 23, 2007).

To finish, White says that these validation procedures help scientists at NIH understand alternative medicines as not in the, "antidote kind of pathway" (Jeffrey White, personal communication, June 18, 2007). Therefore, scientific validation, based on Western science translates the mechanism of action to Western science and in turn standardizes drugs to allow for mass production.

2. Indigenous validation techniques

In addition to these standardized validation techniques the NIH does recognize some indigenous validation procedures as many populations only had "trial and error" (A. Hammed Khan, personal communication, May 25, 2007) to validate their medicines. For example, Cragg notes that:

if a plant was collected with a history of a…traditional medicine…we had our very routine type extraction procedures but we would also use the…extraction method used by the traditional healer you know…they [the traditional healers] you know make a tea of it… (Gordon Cragg, personal communication, May 23, 2007).

In addition, researchers around the world can submit drugs or procedures they've developed based on indigenous knowledge to the NCI. Experts at NCI further evaluate these procedures. Cragg says these procedures are valuable because local people often point out medicinal properties overlooked by the NIH scientists.

White also acknowledges that:

there are certain things that are folklorish things about how…to appropriately gather a therapeutic herb let's say, you know, what is the time of year, what's the, you know, what would [be] the growth, what would the season have to be like [or if the medicine is better as a] mixture, then to use a higher dose of this single compound…(Jeffrey White, personal communication, June 18, 2007).

White, however, does say that the local researchers or traditional healers have to prove that these indigenous methods work because in his experience he has found it difficult for them to prove these methods and, "so far it's just hand-waving" (Jeffrey White, personal communication, June 18, 2007). He says that scientific proof according to the conventional standards, is key to understanding how these medicines work.

F. Opportunities

Due to the institutionalization activities and process for indigenous knowledge at the NIH, the opportunities to integrate these forms of knowledge are vast. In addition, natural products provide greater possibilities for drug discovery. This is mainly because the knowledge becomes standardized to Western knowledge in structure and form. Khan expands on drug discovery by noting that countries such as India are:

sitting on a herbal gold mine [and although] in India a thousand years of experience of using plants…we don't know what gene produces what essential component… (A. Hammed Khan, personal communication, June 18, 2007).

He suggests that research should be done to isolate those genes to produce novel and important

drugs that can be used to treat a variety of diseases.

NIH's NCCAM and OCAM and the office of dietary supplemental also support a lot of research in this area. As Cragg says:

they aren't biased or prejudiced against these so called alternative remedies and…you'll even find articles in good journals [and in] American medical associations…where they start to look at validating herbal treatments and that…I mean there might still be a high degree of skepticism…but, at least they are starting to look at things now….(Gordon Cragg, personal communication, May 23, 2007).

Cragg also tells me that:

cholesterol lowering drugs which are close to 30 billion dollars a years sales from the pharmaceutical companies…is made from a fungus…[and] immuno-depressent drugs that are used in transplant surgery psychlosporen [also] came from a fungus in Norway… (Grodon Cragg, personal communication, May 23, 2007).

Therefore, scientists are aware of the medical opportunities held by alternative medicines. Cragg truly believe that there's, "just a tremendous correlation between traditional knowledge and effective new drugs" (Gordon Cragg, personal communication, May 23, 2007).

White adds to this by saying that, "there is a growing interest in use of nutritional supplements, certain vitamins, minerals, certain other bioactive food components, even certain herbal products…" (Jeffrey White, personal communication, June 18, 2007). White believes that the connection between the two knowledge systems will become stronger as people "have enough knowledge in both areas, in the traditional medicine area and the conventional research area" (Jeffrey White, personal communication, June 18, 2007) so that it is appropriately translated and related to both medical communities. As an example, Cragg says that when he visited China and Hong Kong in the early 1990s:

there [were] oncologists…who actually use the two systems…in Beijing, in the cancer hospital. They will treat the patient with the conventional what they might call the Western style drugs and then bring the then traditional medicines, which I mean, is quite effective, you know, in boosting the [immune] system and so forth… (Gordon Cragg, personal communication, May 23, 2007).

Although Cragg, White, and Khan recognize some opportunities for alternative medical research there are also numerous challenges in this work. Below is a discussion of the challenges faced by alternative medical forms at the NIH.

In addition, there have been many positive outcomes for the Natural Products Branch. Since 1960, only seven plant-derived anticancer drugs have been approved by the Food and Drug Administration (FDA) for commercial production and use: taxol, vinblastine, vincristine, topotecan (a camptothecin derivative), irinotecan, etoposide, and teniposide.[145] After over 40 years of screening these extracts, the most important discovery by the Natural Products Branch has been Taxol, a cancer drug, used to treat several cancers including breast and ovarian. According to the Natural Products Branch, each year 20,000 extracts are tested, and 98 percent of them do not show any activity against cancer or AIDS. For example, since 1986, over 40,000 plant samples have been screened, but to this date only five chemicals show activity against the AIDS virus and only three of them made it to preclinical development.[146]

Also, since 1986, Cragg says that, "50 to 60 thousand plants…which probably represent about 15, 000 different plant species [have been collected. And] over 20, 000 marine organisms, [have been identified], from different parts of the world mainly from tropical areas" (Gordon Cragg, personal communication, May 23, 2007). This repository is being considered as a source of novel compounds and will be added to the 500,000 compounds envisaged for the NIH Roadmap Molecular Library (Zagorski, 2004).

G. Challenges

Despite the NIH's attempt to standardize natural products or alternative medicines to Western science, members of the Natural Products Branch faced several challenges which limited the integration of these forms of knowledge at the NIH. The challenges

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[145] See http://dtp.nci.nih.gov/branches/npb/index.html (Last accessed on February 21, 2008)
[146] See http://dtp.nci.nih.gov/branches/npb/index.html (Last accessed on February 21, 2008)

alternative medical forms face at the NIH can be categorized into these areas: 1) limited

opportunities for research; 2) scientific validation; and 3) quality of products.

1. Limited opportunities for cancer research

Although there are many opportunities for research of alternative medicines at the

NIH, especially in terms of drug discovery, there are also many limitations in this area.

For instance, in the area of cancer Cragg says that, "[I]n many countries cancer isn't their

major health problem, they are busy fighting diseases like malaria and diabetes and

parasitic diseases you know infections and so forth" (Gordon Cragg, personal

communication, May 23, 2007). Cancer is generally very invasive and grows internal,

except if found on the skin, and it is more difficult to diagnosis using external detection

procedures. Unfortunately, many traditional medicines are based only on external

diagnoses or detection procedures. Therefore, Cragg also tells me that if plants were used

for cancer treatment, it was generally for:

> surface skin cancer say or some sort of skin lesion like which was classified as a cancer
> [or] targeting their actions they…[and] boost [patients'] bodies defenses. But when if
> you find cancer which is aggressively growing in someone which is
> metastasized…you've got to treat it…in a very aggressive way and that's where these
> single chemical drugs are [helpful because] they are very toxic… (Gordon Cragg,
> personal communication, May 23, 2007).

Despite extensive screening procedures the NIH uses, Cragg says that, finding a

drug is like, "looking for a needle in a haystack [and that] one of the drawbacks of natural

products is getting sufficient drug…drug discovery and development are a long, long

process…" (Gordon Cragg, personal communication, May 23, 2007).

2. Scientific validation

Scientifically validating isolated drugs from natural products or drugs developed from alternative medicines is another challenge at the NIH. White says, "they're really un-researched…[and] very hard to convince scientific community…" (Jeffrey White, personal communication, June 18, 2007), therefore, the research focuses on looking at how these alternative medicines are validated to the standards of conventional medicines, "like the Western medical system" (Jeffrey White, personal communication, June 18, 2007). Therefore, extensive scientific research and Western validation is their priority before these drugs become available to U.S. consumers on the market.

For example, in Calcutta, they are looking to collaborate with a homeopathy clinic treating lung cancer patients. The doctors in the homeopathy clinic have already done clinical trials and their results show decreases in tumor size in lung cancer patients. The NCI, however, will apply their validation procedure and will re-do some of the validation processes to re-confirm these results. White adds that this re-evaluation of the case is necessary because if the herbal product or alternative medicine is reduced to a single chemical compound and validated then, "you'll have less resistance from the research community…because you try to find a single isolated compound that has an anti-cancer activity" (Jeffrey White, personal communication, June 18, 2007). White, however, does acknowledge that in the process of isolating out the single chemical compound the holistic aspects of an alternative medicine may be, "overlooked [because] its difficult to reproducibly find that activity in that herb [or duplicate the] holistic" (Jeffrey White, personal communication, June 18, 2007) aspect of a drug. He mentions though that there is nothing the NIH can do about this at this time.

3. Quality of products and mechanisms of action

The NIH is also concerned with the quality control and efficacy of alternative medicines. Cragg says that in the U.S., "you're never quite sure what you're…getting [therefore] there's gotta be some sort of control" (Gordon Cragg, personal communication, May 23, 2007). Cragg believes the U.S. government needs to provide more support in this area. He comments that the:

European community has regulations in different countries, Germany, and France, and so forth have strict regulations as to [the] quality of products…[in the] U.S. you just don't have it and the FDA is [just] gradually getting involved in this… (Gordon Cragg, personal communication, May 23, 2007).

He hopes that scientific validation guidelines become stricter in the U.S. and that do not allow alternative medicines to enter (which are solely validated in their home country's procedures). Cragg notes that in turn the number of adulterated products entering the U.S. will also decrease.

H. Future directions

Despite the challenges present and limited drug outcomes, there does exist a future for alternative medicines at the NIH. One important direction this field is taking is in locating new sources for natural products. The program has greatly expanded collection to marine organisms from tropical plants. A new interest has begun in collecting microorganisms from extreme environments, such as bacteria and fungi. Since plants and animal ecosystems are harmed in many ways (i.e. through environmental destructions), microorganisms are important and may replace plant and animal

collections. As Cragg notes, "novel bacteria can be found at the bottom of a polluted lake, or even in the middle of a toxic waste dump" (Gordon Cragg, personal communication, May 23, 2007). Several effective bacteria-derived anticancer agents have already been discovered, and other microbial products are going through the clinical trials in the United States and around the world.

There is a lot of promise with microorganisms because only one percent of microorganisms have been studied. And since microorganisms have shorter life spans and rapid genetic turnover, novel strains are constantly created and in turn produce novel compounds.[147] Genes can also be easily identified and isolated from microorganisms. Once the genes are isolated they may even help re-synthesize plants and animal cells.[148] In addition, microorganisms are easier to store and work with in a laboratory.

In terms of human resources, Khan says that he would like more ethnic diversity represented among the NIH researchers. He mentions that their voice and participation will allow for research in areas concerned to their ethnic populations as opposed to mandates from Congress (Garnett, 1999). This may in turn provide further opportunities for the study of alternative medicines.

Cragg also mentions that the institute needs to work harder with the U.S. Government to control contaminated alternative medical products from entering the country. He mentioned to me that there have numerous cases of adulterated products entering the U.S. over the last few years. Therefore, the institute has many areas in which to further expand and research alternative medicines.

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[147] See http://dtp.nci.nih.gov/branches/npb/index.html (Last accessed on February 21, 2008)
[148] See http://dtp.nci.nih.gov/branches/npb/index.html (Last accessed on February 21, 2008)

I. Conclusion

Although the NIH is interested in alternative medicines or natural products, they are an institution based on Western scientific principles. Therefore, the alternative medicines, which they have validated to their standards are the only ones institutionalized. As discussed in the challenges section, however, drug discovery and development at the NIH is like "finding a needle in a haystack" (Gordon Cragg, personal communication, May 23, 2007) because the intensive screening and extraction process to isolate a single chemical, along with the seven year validation process, does not allow for many novel drugs to be developed.

The NIH's research on alternative medicines contributes to many of the challenges indigenous medicines face against conventional medicines. For instance, the NIH does not completely acknowledge indigenous validation techniques, as they do not translate to Western science. In addition, the NIH strongly enforces re-validating indigenous medicines to their Western medical standards before the drug is institutionalized in conventional medicines.

Research at the NIH is limited to the Western scientific paradigm and mainly focuses on safety and efficacy of medicine for U.S. population use. The future direction of NIH's research is also limited to the validation standards held by the NIH. Therefore, opportunities for indigenous medicines remain limited to the NIH's mission and their objectives in the discovery of novel drugs for U.S. public use.

V. The World Bank's Indigenous Knowledge for Development Program

A. Introduction

The Indigenous Knowledge for Development Program was developed in 1998 when the World Bank began to see itself as the "Knowledge Bank." The Indigenous Knowledge Program operated for close to ten years, from 1998 – 2007, and recently ended on June 30, 2007. In its time at the World Bank the program institutionalized a number of activities on indigenous knowledge, integrated this knowledge into World Bank development projects and into national policies in a number of countries. This chapter presents the second case study in this research study – the Indigenous Knowledge for Development Program – and discusses how the Indigenous Knowledge for Development Program institutionalized indigenous knowledge and the opportunities and numerous challenges faced by the program in this process.

B. Background

This section presents the institution and department the case study was housed in and includes information on the: 1) World Bank History; 2) Africa Region; and 3) Informants.

1. World Bank History

The International Bank for Reconstruction and Development (IBRD) was established in 1945. Today IBRD has the largest country membership and number of staff working in the field of development. Although IBRD remains it's official name, for the purposes of my research I will be referring to the IBRD as the World Bank.

The World Bank was first established to help Europe recover from World War II, however, today the World Bank provides middle and low income countries (considered as developing countries) with loans, guarantees, and analytical and advisory services (World Bank, 2003). Therefore, the institution's main aim is to reduce poverty around the world and increase economic growth (World Bank, 2003). The World Bank also provides loans to poorer countries on easier terms as they are not able to borrow at the rate of other countries (World Bank, 2003).

In 1995, from the start of Wolfensohn's presidency, the World Bank recognized the importance of knowledge in development and aimed to establish itself as a "Knowledge Bank." It aspired to become a knowledge broker for international development policy and knowledge became seen as the "second currency" in the institution's development work.[149] Wolfensohn formalized the initiation of these knowledge activities through the field of "Knowledge Management."[150],[151] The formal establishment of knowledge management affected World Bank development projects by implementing knowledge activities in key areas of the institution. For example, in the Global Distance Learning Network (GDLN) videoconferencing was used to help knowledge exchanges between clients from various regions and World Bank staff.

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[149] Within this framework, the World Bank developed the Knowledge for Development Program to help build countries' capacities, to acquire and use knowledge to strengthen their competitiveness, and to increase their economic and social well-being (World Bank, 2005).

[150] Knowledge Management, many Bank staff have argued, was already an "underground movement" at the World Bank. For example, the Development Economics Group, one of the research units at the Bank, have written reports, from the early 1980s, on the importance of documenting and incorporating knowledge in development practices. Academics and former Bank staff, such as Mosely, Hararigan, and Toye (1991) and Denning (2001), note that these papers were not able to "rock the boat" of an organization dominated by economists. See discussion on this by King and McGrath (2001).

[151] The World Bank now prefers to use the term "Knowledge Sharing" because they believe that knowledge should not be managed but shared.

During this time, the World Bank also organized itself into a two dimensional matrix by having thematic networks cutting across the various regions.[152] Example thematic networks include:

- Environmentally and Socially Sustainable Development (ESSD) - environment, rural development, and social development

- Financial Sector Network - financial sector operations and policy; global operations; and financial market integrity

- Human Development Network (HDN) - education, health, nutrition, and population; and social protection

- Poverty Reduction and Economic Management (PREM) - economic policy; gender; governance and public sector reform; and poverty

- Private Sector Development and Infrastructure (PSI) - energy; information and communication technologies; mining; oil, gas, and petrochemicals; private sector; transport; urban development; and water supply and sanitation (World Bank, 2003).[153]

The purpose of the thematic networks are to provide advisory, data, and IT services to enhance World Bank staff learning and communication on their project work across the regions.

During this time, the World Bank also documented knowledge from development practices into "best practices" or "good practices"[154] and stored this knowledge in centers

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[152] Regions include: Africa; East Asia and Pacific; Europe and Central Asia; Latin America & Caribbean; Middle East & North Africa; South Asia
[153] These thematic groups were developed and operated from 1998-2005; Due to change in presidencies from 2006-2007, thematic groups have also changed.
[154] The World Bank has shifted from using the term best practice to good practice.

called "Advisory Services." [155] The purpose of storing this knowledge in Advisory Services was to help staff and clients easily retrieve this knowledge and use them in their future development projects (World Bank, 2005). The services also allow World Bank staff and clients to, "learn from the successes and failures of past projects, improve future development work and meet the Bank's mission statement," (World Bank, 2003 pg. 51).

In addition to the development of these networks and sectors, the World Bank allowed for small initiatives and programs to develop. The Indigenous Knowledge for Development Program[156] (Indigenous Knowledge Program) was one of the programs that developed out of the Knowledge and Learning division in the Africa region. The Knowledge and Learning division produced knowledge programs to not only capture explicit knowledge, or conduct quantitative data analyses, but also worked to institutionalize tacit knowledge[157] and use participatory and qualitative research methodologies in development work.

For example, the division recognized that it is difficult to capture all dimensions of knowledge through conventional documenting systems or databases, and therefore created programs, such as the Debriefings Program. The Debriefings Program conducted videotaped interviews with clients and staff on good practices and lessons learned in

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[155] For example the Human Development Network and Education Department's Education Advisory Service creates "knowledge nuggets" of best practices in Education operations projects and materials on numerous education topics. The knowledge service answers Bank staff and clients queries on topics in education, designs and maintains the Education website, among other important activities to ensure effective knowledge transfer among Bank staff and clients. See the Education Advisory Service: http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTEDUCATION/0,,contentMDK:20253087~ menuPK:282440~pagePK:148956~piPK:216618~theSitePK:282386,00.html

[156] The program is now referred to as the Indigenous Knowledge for Results program because of the change in leadership and mission/objectives of the institution

[157] For example, knowledge that is not easily codified or documented. Oral histories can also be considered tacit knowledge. For more information on tacit knowledge see Antweiler (1998).

areas of World Bank development work.[158] Since much of indigenous knowledge is generally not codified and does not exist as explicit knowledge,[159] the Indigenous Knowledge Program also worked with techniques developed in the area of tacit knowledge to capture all dimensions of indigenous knowledge.

2. Africa Region

Although the Indigenous Knowledge Program was located in the Africa region, the program's main aim was to be a globally operating program. It attempted to work with all regions and sectors at the World Bank. Most of the initiatives and pilot projects were implemented in the Africa region, however, and the program's main focus became the Africa region. The primary reason for this is because the managing director of the program, Nicolas Gorjestani, was working in the Africa region. Therefore, below I briefly describe the Africa region at the World Bank.

The World Bank recognizes that approximately 300 million Africans - nearly half the region's population - still live in extreme poverty (World Bank, 2003). The World Bank's strategy in Africa is to help the region meet the Millennium Development Goals. Areas of development the World Bank focuses on in the Africa region include, governance, conflict resolution, development of human resources, diversifying in-country productions to increase their competitiveness, and reducing dependence on foreign aid and debt (World Bank, 2003). Within the idea or concept of the Knowledge Bank some of the regional initiatives in the Africa Region included: The Africa Project Development

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[158] See www.worldbank.org/afr/ik (Last accessed on February 21, 2008). Also, Davenport and Prusak (1998), in *Working Knowledge*, write that multimedia programs and other internet programs are very important tools to capture the tacit dimension of knowledge.
[159] For example, oral histories.

Facility; African Management Services Company; Global Partnership for Eliminating River blindness; the Indigenous Knowledge Program[160]; The Multi-Country HIV/AIDS Program; New Partnership for Africa's Development; Nile Basin Initiative; Transport Policy Program for Africa(World Bank, 2003).

3. Informants

I interviewed three informants at the World Bank. One of my informants, Siddhartha Prakash[161], worked only for the Indigenous Knowledge Program during his 8 years at the World Bank. He recently (in 2006) left the World Bank and is currently working in India. He holds a masters from the London School of Economics in development studies and previous to his position at the World Bank he worked at the World Trade Organization. With the Indigenous Knowledge Program he worked on collecting indigenous knowledge related to health and agriculture and on issues of intellectual property rights.

Sharon Watkins has been a consultant at the World Bank for 5 years. She has primarily worked with the Knowledge and Learning Group (now known as Results and Learning Group) where the Indigenous Knowledge Program. Her work with this group has focused on knowledge management activities, particularly in capturing tacit knowledge (including forms of indigenous knowledge) in World Bank projects. Watkins holds a M.A. in International Affairs and an MBA from American University.

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[160] This program, "documents local or traditional knowledge in developing countries and applies this knowledge to issues of development. The program is a partnership between the World Bank and various U.N. agencies, bilateral development agencies, and nongovernmental organizations (NGOs)." (World Bank, 2003).

[161] Siddhartha Prakash could not be photographed.

Krishna Pidatala is an information scientist and senior staff member at the World Bank. He worked with the Knowledge and Learning Division, under Nicolas Gorjestani, for 8 years. He has been involved in a number of indigenous knowledge field projects including an early childhood development project in Eritrea. Currently Pidatala works with the Information Solutions Group at the World Bank.

C. Indigenous Knowledge Program

This section showcases the history and development of the case study – the Indigenous Knowledge Program and presents it's: 1) History and formation; 2) Location; 3) Rationale/Objectives of the Program; and 4) Main Activities.

1. History and formation

The World Bank's Indigenous Knowledge Program emerged within the framework of the Knowledge Bank,. In a document marking five years of the Indigenous Knowledge Program, Wolfensohn recognized the program and stated that the World Bank need to, "not only…provide its own know-how gained through more than 50 years of development experience, but…equally learn from the practices of communities so as to leverage the best in global and local knowledge systems" (Local pathways to global development, 2004). This was the main philosophy behind the work of the Indigenous Knowledge Program. The program managers believed that indigenous and community-based practices could contribute substantially towards the reduction of poverty[162] and improving livelihoods of the poor around the world. Therefore, the program worked

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[162] Reduction of global poverty is the World Bank's main mission

towards fostering and increasing the use of indigenous knowledge in the development process.

The Indigenous Knowledge Program officially started in 1998 after a Global Knowledge Conference held in Toronto June 1997 (Woytek, 1998). At the conference, government leaders and civil society groups expressed concerns that the World Bank and other multi-lateral donors were not learning and developing based on local communities' knowledge.

Also, around the same time many World Bank client feedback surveys from African countries mentioned that country authorities and stakeholders wanted World Bank staff to do a better job working with and adapting their local knowledge into development practices (Gorjestani, 2005).[163] The surveys indicated that World Bank clients were highly satisfied with the Bank staff's knowledge on international best practices, but dissatisfied with their effectiveness in adapting this knowledge to the respective country's and community's conditions. Gorjestani and his Indigenous Knowledge Program team, hence, argued that, "…investing in the exchange of IK [Indigenous Knowledge] and its integration in development programs supported by the Bank and its development partners [would] help achieve the overriding development objective, [and] the reduction of poverty…" and that therefore, "IK is a critical factor for sustainable development…" (Gorjestani, 2004).

Therefore, at the end of the Global Knowledge conference, the Vice President of the World Bank's Africa Region said the World Bank would, "support a vision in which the poor would participate as both users and contributors to knowledge in development practices" (Gorjestani, 2004).

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[163] Gorjestani (2005) references this as the knowledge adaptation gap.

Watkins adds that, "so our group [Knowledge and Learning – the bigger division in which the Indigenous Knowledge Program was held] was all focused on knowledge management, knowledge sharing, tacit knowledge, and how that plays out in development.   And as such…Nicolas Gorjestani, who was the manager of the group…piloted this program called the Indigenous Knowledge Program in order to look at lessons of development as they've had in the communities themselves" (Sharon Watkins, personal communication, July 27, 2007).

In 1998, Gorjestani submitted a proposal to the Innovation Market Place and won first place. [164]   The Development Market Place was created in 1998 and with an allocation of $ 3 Million, the Innovation Marketplace was initially an internal Bank program. In 2000, at that time called the "Global Development Marketplace" was opened for external participants and received more than 1,000 proposals from in and outside the Bank.   Gorjestani (2007) says that, "Wolfensohn thought it was a good idea and we managed to get him to buy into the marketplace."   Therefore, the initial funding for the Indigenous Knowledge Program was from the Innovation Market Place.   After this first year of funding, Prakash says that the, "program [was] based on funds we had got from different donors, from the Swiss and Netherlands" (Siddhartha Prakash, personal communication, July 22, 2007).

Since 1998 the Indigenous Knowledge Program staff have done extensive work by capturing and documenting indigenous and community-based practices from all over

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[164] See What is Development Marketplace?
http://web.worldbank.org/WBSITE/EXTERNAL/OPPORTUNITIES/GRANTS/DEVMARKETPLACE/0,,contentMDK:20083068~menuPK:218640~pagePK:180691~piPK:174492~theSitePK:205098,00.html

the world, (with a special focus on Africa),[165] and institutionalizing this knowledge at the World Bank. During the creation of the program, different goals and strategies were also developed to achieve the objective of fostering and implementing indigenous knowledge in the development process and to effectively reduce poverty. These and the organizational creation and location of the program are detailed in the next section.

2. Location

As mentioned in the previous section, the Indigenous Knowledge Program was initially based on a proposal written by Nicolas Gorjestani, who managed the Knowledge and Learning Division, and supported by a grant from the World Bank's first Innovation Marketplace. The program, therefore, became integrated into his Knowledge and Learning division within the Africa Region's Vice Presidency. Unlike several programs addressing related issues, such as the Indigenous Peoples Program or the Community Driven Development Program, the Indigenous Knowledge Program was not anchored in any globally operating network, but rather it was part of an operational department within the Sub-Saharan Africa region. Therefore, its location limited its interactions with other regions and the major networks. Within this operational department, however, the Indigenous Knowledge program staff have worked hard to pursue the goals of the program over the last eight years.

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[165] As discussed earlier, since the program was located in the Africa region, there was focus on development work in Africa.

3. Rationale/objectives of the program

The main rationale behind the Indigenous Knowledge Program was to introduce indigenous knowledge and practices in health, agriculture, and education, among other areas, into international development so that this knowledge is a part of global development discourses and development practices (Woytek et al., 2004). Prakash adds that the program promoted, "indigenous knowledge in development and the ideals to promote local knowledge in World Bank funded projects related to health care, agriculture, environment practices" (Krishna Pidtala, personal communication, August 28, 2007).

As mentioned earlier, the rationale and support for the program mainly drew from client feedback surveys, which were in response to World Bank projects and interaction with staff members. The surveys indicated that about 75 percent of clients were satisfied with staff knowledge of best practices, but only 35 percent were satisfied with World Bank's staff abilities to adapt best practice knowledge to the local setting (Gorjestani, 2005).

Therefore, the program was designed to help the development community learn more about the indigenous practices in the local community or of the country in order to better serve the community's or country's needs. Watkins adds that even the Knowledge and Learning division's (in which the Indigenous Knowledge Program was located) main role became bringing:

attention of people that are actually doing the project work [and] trying to communicate how important it is to take into consideration what's already being done and how you

have to look at that and incorporate it in project work (Sharon Watkins, personal communication, July 27, 2007).

Staff in the program also advocated that by investigating what local communities already know and have, development practitioners can improve the design of activities or programs for local communities (Woytek, 1998). This methodology, in turn, was supposed to assist in the sustainability of World Bank development assistance. In the field of health, for example, Prakash says the program helped:

document this traditional knowledge that was being used to produce these indigenous medicines, and then mainstream these indigenous practitioners and their practices into health projects, into health policies (Siddhartha Prakash, personal communication, July 22, 2007).

4. Main activities

In the Indigenous Knowledge Program's "Framework for Action" document, the director and manager of the program established four pillars as the objectives for the program: "(a) Dissemination of Knowledge and community-based practices that are relevant for the development process and reducing poverty; (b) Facilitating learning and knowledge exchange among communities; (c) Mainstreaming indigenous knowledge in national development policies and projects supported by the World Bank and other donors; and (d) Building partnerships in order to broker collaboration on knowledge issues between local practitioners, community-based organizations, governments, donors, the global scientific community and other international organizations" (Woytek, 1998). These four pillars help the indigenous knowledge program institutionalize indigenous knowledge at the World Bank. They are detailed further below.

a. Dissemination

Different measures were undertaken over the last eight years to achieve these objectives. In order to disseminate information on indigenous knowledge in different areas, such as health, agriculture, natural resource management, education, conflict resolution and others, the program created a database on indigenous knowledge practices with approximately 300 entries and made this database available on the program's website.[166] The database is a service to users from different countries and regions so that they can exchange indigenous or community-based solutions on development issues.[167]

Furthermore, in October 1998 the first "IK Note" titled *Indigenous Knowledge Systems in Sub-Saharan Africa: An Overview on indigenous knowledge systems in Africa* was published. The monthly publication *IK Notes* reported on development issues and the effective application of indigenous knowledge in development. It published case studies from different development sectors written by development practitioners or scholars.[168] After publishing 60 *IK Notes* and marking five years of the Indigenous Knowledge Program, the program published a book entitled *Local Pathways to Global Development* (which is a compilation of the *IK Notes*).

The program's website also aimed at opening a gateway to development approaches that rely on indigenous knowledge. It raised awareness among the

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[166] The Indigenous Knowledge Program's database documents to date 286 best practices in using indigenous knowledge for development. See http://www4.worldbank.org/afr/ikdb/search.cfm . Database last checked on February 21, 2008.

[167] The program does display a disclaimer with their database stating that : "Disclaimer: The fact that this knowledge is displayed on this website does not constitute an approval—or in the case of the rejection of a contribution, a disapproval—by the World Bank or its partners in the Indigenous Knowledge Program of the validity of the knowledge."

[168] For a recent survey on the impact of the *IK Notes* on readers practicing and using indigenous knowledge in their work see Rueger (2006). The publication was distributed electronically and as paper copy to about 15,000 readers. Since internet access is still limited in developing countries, the majority of the hardcopy readers (about 7000) live in developing countries, mainly in Africa. See Indigenous Knowledge Notes: www.worldbank.org/afr/ik

development community on the importance of indigenous knowledge and community-based practices and supported the institutionalization of these practices in the World Bank's partner activities. In addition, the program's website provided general background information on indigenous knowledge in development and published case studies, toolkits and other instruments for the integration of community-based practices into development projects. For example, the website held a virtual marketplace to help broker contacts between proposal seekers and potential funding agencies. It provided a space for practitioners to post proposals on the web so that donors could search the indigenous knowledge program website and review posted proposals.[169]

The Debriefings Program, another initiative in the Knowledge and Learning division, also helped to disseminate indigenous knowledge. Watkins says:

we were doing debriefings…and our role was to basically disseminate information and track best practices throughout the Bank…basically IK was something that came into our work very strongly, particularly in the first few years [1998-2004], because the leadership and our group, our division saw it as a key role of the knowledge sharing initiative (Sharon Watkins, personal communication, July 27, 2007).

For example, the website showcased debriefings so clients, partners and Bank staff could exchange lessons of operational experience to better development results.[170] Watkins also adds that the manager, Nicolas Gorjestani, made sure that every one of the programs within the division [Knowledge and Learning] had something to do with IK just because, for example, the articles, we would choose to write on or publish, for the

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[169] The Indigenous Knowledge Program noted that they by displaying these proposals on their website it does not constitute an approval, validity, or in the case of the rejection of a contribution, a disapproval of the proposal by the World Bank or its partners in the Indigenous Knowledge Program.
[170] See www.worldbank.org/afr/ik (Last accessed on February 21, 2008)

Findings and Info-brief series[171] would be related to IK in some capacity. Also, in the Debriefings Program we would debrief people and one of the focuses in our interviews would be how did you achieve local fit? (Sharon Watkins, personal communication, July 27, 2007).

b. Learning and knowledge exchanges

The program staff organized several knowledge and learning exchange tours for Bank staff working in the Africa region. The staff members visited development projects in South Asia, who were successfully using indigenous knowledge. These exchanges allowed World Bank staff to learn from the practices and they were encouraged to integrate indigenous knowledge into their operational work in the Africa region.

Three cross regional tours called the "South to South" learning events were organized in order to facilitate knowledge exchanges between communities in East Africa and South Asia. The purpose of these tours was to allow South Asians to share their strategies and activities of their indigenous knowledge activities to the East Africans who could adapt similar strategies with their own communities. For example, in 2004, local members of the Women's Development Initiative in Ethiopia, and the Social Action Fund Projects in Malawi and Tanzania, visited community projects with indigenous knowledge components in South East Asia. Through this exchange, the Ethiopia Women's Development Initiatives Project was able to implement locally developed income

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[171] Findings and Infobreifs report on on-going operational, economic, and sector work carried out by the World Bank and its member governments in the Africa Region. See http://www.worldbank.org/afr/findings/default.htm

generation strategies they learned from the Self Employed Women's Association (SEWA) in India.[172]

Watkins says that they also:

track[ed] and record[ed] [the tours by] interview[ing] members of communities themselves that had been in recipients of World Bank aid and to interview communities that had an indigenous knowledge practice that the Bank felt that it should disseminate and use as an example [and]…that can be transferred to other developing communities (Sharon Watkins, personal communication, July 27, 2007).

She adds to the SEWA example by saying that:

we met with groups…such as the Self-Employed Women's Association (SEWA) that directly benefited from Bank aid, and as at that time we saw our role as disseminating [their] information and in a sense validating what SEWA had done…(Sharon Watkins, personal communication, July 27, 2007).

As follow up to the South-South tours the program staff launched a series of distance learning courses. In 2005 and 2006, three learning events were organized, focusing on the role of indigenous knowledge in implementing the Millennium Development Goals (MDGs), combating HIV/AIDS and the management of natural resources.[173],[174] Facilitated by the program staff, in each course participants exchanged information and practices on indigenous knowledge.

For example, in the *Integrating Local Knowledge into the Multi-Country AIDS Programs* distance learning course, government representatives and traditional healers from six participating East African countries shared experiences and information on how indigenous healing knowledge can be integrated into their national HIV/AIDS programs. Course participants in Africa showed evidence that indigenous plants, that are cultivated

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[172] See www.worldbank.org/afr/ik (Last accessed on February 21, 2008). See also Pidatala (2004) on further descriptions of the South-South tours
[173] See www.worldbank.org/afr/ik (Last accessed on February 21, 2008)
[174] See also Prakash (2005) on further descriptions of the Indigenous Knowledge Distance Learning Course

in home gardens, can contribute to the food security of HIV/AIDS patients and also provide them with extra income if they sell these plants in local markets(Lengkeek, 2005). Therefore, the course proved that indigenous knowledge in agro-forestry can be very beneficial for these patients.

Different learning tools such as, toolkits, documents, and multi-media files providing case studies and examples on how to identify and integrate indigenous knowledge in development, are also available on the program's website. These learning tools include literature, videos, interviews and web-links that provide information and can assist development practitioners to achieve the MDGs.[175] Each toolkit, for example, showcases successful approaches in achieving one of the MDGs based on a practical country experience. The toolkits also provide users with lessons of development experiences on 'what works' and 'how to do it' in indigenous knowledge so that this knowledge can be scaled up and used in other communities. An example toolkit is the Community Knowledge Exchange Toolkit I and II, where tools are provided for the preparation, implementation, and evaluation of community-to-community knowledge and exchanges.[176],[177]

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[175] See www.worldbank.org/afr/ik (Last accessed on February 21, 2008). See Program's website for the toolkits, literature, multimedia, and indigenous knowledge case studies:
http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/EXTINDKNOWLEDGE/0,,contentMDK:20664323~menuPK:1692812~pagePK:64168445~piPK:64168309~theSitePK:825547,00.html

[176] See www.worldbank.org/afr/ik (Last accessed on February 21, 2008)

[177] For more information on this toolkit see :
http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/EXTINDKNOWLEDGE/0,,contentMDK:20780121~menuPK:1742726~pagePK:64168445~piPK:64168309~theSitePK:825547,00.html

c. Mainstreaming

Mainstreaming or integrating indigenous knowledge in the development process was done through several different measures by the program staff. Besides hosting activities to raise awareness, such as presentations and workshops to demonstrate the relevance and effectiveness of indigenous knowledge, the program also set up an $250,000 Indigenous Knowledge Integration Fund (Woytek, 1998). The money was provided to task managers at the World Bank who planned to integrate indigenous knowledge in their operational work. Therefore, in addition to receiving guidance from the program staff, the fund provided World Bank project teams with some financial support to hire consultants, conduct workshops, and other things, so they could identify and integrate relevant indigenous knowledge and practices into their operational work.

Following the creation of the integration fund, different Bank operations in the Africa region and South East Asia region began to integrate indigenous knowledge into their operations work. The Agricultural Research and Training Project in Uganda, for example, built on indigenous practices in agriculture in their outreach programs. Members of the Africa Multi-Country AIDS Program organized and trained traditional healers on HIV/AIDS practices and supported the treatment of opportunistic infections using traditional medicine. In India, the World Bank's South Asia Unit's director supported the Karnataka Watershed Development Project where indigenous knowledge was used for organic farming and cultivating medicinal plants. The project in Karnataka also helped start community exchanges to other watershed projects within India and Sri Lanka so that these strategies on watershed development practices were shared.[178] Some of the integration fund supported projects eventually created free-standing projects on

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[178] See www.worldbank.org/afr/ik (Last accessed on February 21, 2008)

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indigenous knowledge, including the Conservation and Sustainable Use of Medicinal Plants Projects in Ethiopia, Integrated Early Childhood Development Project in Eritrea, and the Northern Uganda Social Action Fund (Gorjestani, 2005).

Prakash adds that the integration fund also helped in institutionalizing indigenous knowledge into National Development Policies. Following a multi-stakeholder workshop held in December 1999, Uganda, for example, formulated the Kampala Declaration on Indigenous Knowledge for Sustainable Development. This declaration eventually led to the integration of indigenous knowledge into the Uganda Poverty Eradication Action Plan (PEAP). The former president of Tanzania, Benjamin Mkapa also drafted a national action plan on indigenous knowledge (Local pathways to global development, 2004).[179]

d. Building partnerships

The program staff also conducted joint seminars with researchers, NGO representatives and development practitioners from African countries to show how indigenous knowledge can be used to achieve the Millennium Development Goals. A partnership with the Global Research Alliance, for example, was established to help develop a collaborative process for the validation of indigenous medicinal approaches and to promote medical innovation at the community level. Within the Bank, the program also formed alliances with the Development Gateway[180] and many of the Africa Region knowledge initiatives were featured on the Development Gateway website (Gorjestani, 2002).

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[179] The Indigenous Knowledge Program has also worked with the government of Kerala, in India, to integrate indigenous knowledge into their five-year plan.

[180] Development Gateway is an, "Internet portal for information and knowledge sharing on sustainable development and poverty reduction" (The World Bank, 2003 pg. 63).

Prakash adds that there was also, "a lot of cooperation…particularly [with] the WIPO[181], and the NIH [in which] there was a very good relationship" (Siddhartha Prakash, personal communication, July 22, 2007). The program worked with the World Intellectual Property Rights Organization (WIPO) on intellectual property rights issues and relied on the validation research the NIH does on traditional medicines in developing countries. He adds that, "[The NIH] shared that [validation] knowledge with us" (Siddhartha Prakash, personal communication, July 22, 2007). In addition, Prakash says that the program worked with:

UN agencies and other donors to sensitize and make them aware that you have this great resource of traditional knowledge in the health domain that can contribute towards combating HIV/AIDS epidemic in Africa (Siddhartha Prakash, personal communication, July 22, 2007).

D. Definition set for indigenous knowledge and nomenclature

The Indigenous Knowledge Program broadly defined indigenous knowledge as, "unique to a particular culture and society; it is the basis for decision-making in agriculture, health, natural resource management, and others. It is embedded in community practices, institutions, relationships, and rituals. It is also considered as tacit knowledge" (*Local pathways to global development*, 2004). The program also described indigenous knowledge as "knowledge which is not easily codifiable" (*Local pathways to global development*, 2004) and as, "dynamic, continuously changing being influenced

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[181] World Intellectual Property Rights Organization

internally (within a community) as well as by external contact or external systems or innovative" (*Local pathways to global development*, 2004).[182]

Watkins adds that the Indigenous Knowledge program:

had defined indigenous knowledge as any tacit knowledge, any home-grown knowledge that works for the community, applies to the community, is something that's been practiced over generations, perhaps, when we say indigenous all we really mean is local (Sharon Watkins, personal communication, July 27, 2007).

Pidatala also emphasized the term "local" and the locality of knowledge to an area when defining indigenous. He says the program recognized indigenous knowledge as, "local knowledge, or knowledge that people in communities, in that particular, or in that particular area had" (Krishna Pidatala, personal communication, August 28, 2007).

The Indigenous Knowledge Program also interchangeably used the terms local and traditional with indigenous – referencing all terms to have the same definition. Prakash says that:

from the World Bank's Indigenous Knowledge Program we simply…looked [at and], considered indigenous knowledge, traditional knowledge, local knowledge, all knowledge systems that were based on local community expertise and experience, and basically it was knowledge that worked to help solve development problems. And our objective was basically to capture this knowledge, document it, and mainstream it. Didn't matter what the terminology use (Siddhartha Prakash, personal communication, July 22, 2007).

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[182] Examples of indigenous knowledge in development as defined by the program – midwives and herbal medicines, treatment of cattle ticks by the Fulani using Tephrosia plants, soil and land classification in Nigeria, local healers role in post-conflict resolution in Mozambique, transfer of knowledge through elders, rituals, initiation, and story tellers in West Africa, systems of control power and distribute wealth among the Masai in East Africa (Woytek, 1998).

Watkins adds that the program did not have to call the knowledge it worked with as indigenous and says, "the emphasis should lay in the way it is defined – locally relevant knowledge" (Sharon Watkins, personal communication, July 27, 2007).

E. Institutionalization of indigenous knowledge – identification and validation

1. Identification of indigenous knowledge

In regards to how indigenous knowledge was institutionalized at the World Bank or integrated into projects, my informants told me that there was no formal procedure in identifying indigenous knowledge before it was institutionalized. They indicated that identification of indigenous knowledge depended on the local circumstance. Watkins says that they primarily looked for knowledge, which was validated by local community members. For example, she describes that in their work with the Tanga AIDS working group, in Tanzania, "had their own traditional practices for treating HIV/AIDS and also their own success stories" (Sharon Watkins, personal communication, July 27, 2007) which helped the Indigenous Knowledge Program to identify the group as having indigenous knowledge. She adds that, "the work of this group had never been validated by any external scientific research" (Sharon Watkins, personal communication, July 27, 2007).

Prakash says that most of his work with the program was in the field in countries of East Africa, India, and Sri Lanka where he met with:

traditional herbalists and healthcare practitioners in the country and travel[ed] extensively throughout the country to meet them, to see their work, to talk to their patients, and what they are doing… [In addition, he says the program would do] some preliminary assessment of who looks like they are credible, [that] seem to be having practices that follow safety and efficacy guidelines, maybe not at the standard of the WHO or NIH, as yet, but at the local level…what seems to be working, and most importantly from the

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patients, who could tell that there is a clear impact of the treatment[183] (Siddhartha Prakash, personal communication, July 22, 2007).

The program staff did prefer to work with indigenous knowledge, which were well documented or well recognized in the region. For example, Prakash tells me that with his work in Kerala the program worked with the chief ministers office to integrate knowledge and practices of Ayurveda into the state's 10th five-year plan. The program director and staff decided to advocate for Ayurveda because Prakash says this indigenous medical systems is:

very well documented, very well practiced. So there are various incentives to the idea of taking local knowledge [like Ayurveda] and mainstreaming it into development also in [Kerala's] poverty eradication plan (Siddhartha Prakash, personal communication, July 22, 2007).

Pidatala says that participatory research methods were valuable in identifying indigenous knowledge. He describes an Early Childhood Development (ECD) project he was involved with in Eritrea and says that the elders and other key community members of the community helped the team to identify indigenous knowledge. He says that:

the methodology we used [to collect indigenous knowledge] was you know normally what we use, Participatory Rural Appraisals (PRA techniques)[184] we randomly selected residents from ethnic groups…[and] looked at what, at how between these two sets of communities in terms of traditional practices, child rearing practices, what were they doing…[Therefore, the World Bank team in Eritrea] randomly selected residents of three ethnic groups, in two [of the] communities …[and that] people whom we selected should have some knowledge of traditional childrearing practices, they should know what the customary laws and practices are, you know, there's stuff about traditional medicine, teaching, and what we did…we consulted a variety of elders, youth, women, etc. So once we identified that, we basically had two data collectors collect, say, from each village, and we trained them on the PRA techniques. And [the] selection criteria for the data collectors was similar to those [we] interviewed from the community. See one of the

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[183] Or as Watkins says, "interview different kinds of community projects and try and get to the heart of why it worked and their circumstance" (Sharon Watkins, personal communication, July 27, 2007).

[184] The World Bank uses PRA techniques to obtain information on demographic, socio-economic and cultural information to prepare management or development plans.

things we want to make sure is that we want to ensure ownership of the community in this indigenous knowledge exercises, it should not be as if somebody is coming from outside, just interviewing you and going. No. They should feel part of the process, they should trust you so that they should open up and tell you (Krishna Pidatala, personal communication, August 28, 2007).

The team in Eritrea cross-referenced data collected through audio recordings. The local data collectors traveled with sound technicians so that written notes could be verified with audio recordings. The team from the World Bank then selected key areas of development they felt the community needed and prepared the necessary paperwork to grant further World Bank support in this area. Therefore, the team from the World Bank decided on the knowledge's significance and relevance to solving the community's problems, its reliability and consistency[185], its functionality in the community and transferability to other communities (Woytek, 1998).

Watkins adds that the program also tried to recognize cultural aspects which validate an indigenous practice. Therefore, local forms of evidence and the local sociocultural background were considered important in validation of indigenous knowledge practices. She says:

some of the time, we would find that its, not kind of, almost a matter of financial or physical resources, but culture. Like in the case of the Self-Empolyed Women's Association, there was you know all kinds of things to do with community involvement and…communities working together, and very entrepreneurial spirit, and all kinds of thing that, you know, the Africans that were on the tour with us said that you know, these cultural things were something that had probably contributed to the success of that project. So sometimes its not…as financial or physical resources, its more intangible" [that local evidence that validates indigenous knowledge] (Sharon Watkins, personal communication, July 27, 2007).

Therefore, the Indigenous Knowledge Program staff recognized local evidence and socio-cultural backgrounds as important during validation and evaluation processes.

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[185] Meaning the knowledge should be a coincidence or accidental

2. Validation

Although the Indigenous Knowledge Program staff relied on local community members and techniques to validate indigenous knowledge (i.e. not validated by the Western scientific method), they did "filter" out indigenous knowledge which they feel may be harmful to a community and displays disclaimers on their website. For instance, the staff has the authority to decide whether an indigenous knowledge practice is beneficial or not in the development process. The staff also recognizes that not all forms of indigenous knowledge are appropriate to solve a community's problem. They identify slash and burn agriculture and female circumcision as harmful indigenous practices, which they believe, need to be eliminated from local community practices. Therefore, before they adapt indigenous knowledge, integrate it into development programs or even disseminate it, practices are checked by program staff and evaluated as appropriate. In terms of their disclaimers, these are displayed next to the program's on-line database and their on-line proposals state that the program or the World Bank is not validating this knowledge, but simply disseminating the knowledge for public awareness (Indigenous Knowledge for Results Program, 2007b).

Although the program staff refer to themselves as the "Indigenous Knowledge" Program, the knowledge the program works with is mainly knowledge which is locally adaptive or knowledge which is owned by local communities. Even though my informants indicated that the indigenous knowledge was validated by the community members themselves the program had a validation framework to ensure the indigenous knowledge or practice was significant for the community's development. Harmful

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indigenous knowledge or practices were identified and the programs members supported local programs designed to eliminate these practices.

F. Opportunities

The opportunities for indigenous knowledge at the World Bank were created from the main activities and the processes involved in the institutionalization of indigenous knowledge. As previously discussed, many opportunities were present for indigenous knowledge at the World Bank. The Indigenous Knowledge Program was able to institutionalize some indigenous knowledge at the World Bank through various instruments and publications and the $250,000 integration fund. In addition, between 1998 and 2004 the Indigenous Knowledge Program received much institutional support. For example, Wolfensohn inaugurated the Indigenous Knowledge Program's website in local African languages and after reviewing several of the program's documents he provided the team with constructive feedback for their further development of the program at the World Bank.

Gorjestani (2007) appreciated Wolfensohn's leadership and support for the Indigenous Knowledge Program. He remembers an incident right before the 2001 Spring meetings where Wolfensohn asked the Indigenous Knowledge Program to prepare some documents which Wolfensohn could present to the World Bank Board of Governors, Gorjetani (2007) says, "we ended up coming up with this interesting sort of pamphlet and in it learning from local communities and the president saw the local – global,[186] you

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[186] The pamphlet is entitled *Learning from Local Communities* and provides readers information on the program, indigenous knowledge tools, how to mainstream indigenous knowledge, how to exchange indigenous knowledge, and information about the *IK Notes* series. The pamphlet also clearly defines indigenous knowledge and provides many examples.

know, globalization with a human face, all these things were in it, and it under his personal signature [he sent it] to every governor at the time. And to me this represents one of the boldest moves this institution has made because it transcended so many paradigms, because it assumed a complete shift that, you know, the poor they're not only arms, legs, and mouths, but they have brains. They have intellectual capital that we need to learn from and we need to transcend this and become more humble that there may be ways, simple ways of dealing with some very, very difficult issues, particularly in the health, in the MDG areas, that we could learn." Watkins also tells me that in general staff at the Bank:

did understand the importance of indigenous knowledge [and that] I think to whatever extent most managers, or task team leaders, that's what they're called [at the World Bank], would be aware of the fact that in order to get a project working it has to take into account the local circumstance. So, I don't think that anyone would disagree with the idea that you have to incorporate local knowledge (Sharon Watkins, personal communication, July 27, 2007).

Many positive outcomes have come out of the Indigenous Knowledge Program's activities. For instance, the program has identified over 300 effective local practices using indigenous knowledge, helped to enhance capacity in several countries to develop national strategies using indigenous knowledge, promoted the exchange of indigenous knowledge among local communities with a number of countries, and raised awareness of indigenous knowledge in development internally at the World Bank and externally. The program has also helped to support World Bank task teams to integrate indigenous knowledge practices into Bank-supported projects and programs (Gorjestani, 2002).

The Indigenous Knowledge website is the second most visited single site (after the Findings and Infobriefs website) on the Africa region's external portal. It has had

10,000 website hits, 4,000 of the hits were to access the resources and about 2,000 books of information have been accessed. The Swahili language version of the IK website has received two and half times the number of visitors to the French version, which suggests that many of the visitors may be from communities the Indigenous Knowledge Program is targeting. The IK Notes sub-site also has a very high hit rate. It has been determined that during one visit to the website, an average of 20 "IK Notes" are accessed (Gorjestani, 2002). These results show that indigenous knowledge is being disseminated through the Indigenous Knowledge Program's website.

In addition, as mentioned earlier, indigenous knowledge related activities have also been integrated into more than twenty-four Bank-supported operations[187]. For example, the Karnataka Watershed Development Project incorporated indigenous knowledge into its farming, medicinal plants cultivation and income generation activities. The program has also organized multiple conferences and workshops on traditional medicines. For example, most recently they coordinated a conference on indigenous medicines with the Global Research Alliance.

The opportunities to mainstream indigenous knowledge at the World Bank, however, remained limited to Wolfensohn and Gorjestani's leadership because they were the main supporters and leaders for the program. After Wolfensohn left the World Bank in 2005 institutional support for the program began to decline and the program officially ended in June 2007 when the program's manager Nicolas Gorjestani retired. Many challenges led to the decline in institutional support and eventual termination of the program. Below these challenges are outlined.

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[187]Granted, I acknowledge the World Bank oversees over 1, 000 projects/year.

G. Challenges

Despite the opportunities created to integrate indigenous knowledge at the World Bank the challenges dominated these opportunities and limited indigenous knowledge to flourish and impact World Bank projects and policies. The challenges the Indigenous Knowledge Program faced at the World Bank can be divided into these five areas: (1) Conventional development paradigms; (2) The culture of the institution; (3) Issues in leadership; (4) Western validation requirements; and (5) Nomenclature – questioning the term indigenous.

1. Conventional development paradigms

All my informants indicated that conventional or Western based development paradigms as one of the biggest challenges for indigenous knowledge at the World Bank.[188] Pidatala says, "most people [at the World Bank] are educated either in Western science or in the Western academic background, they're incapable of appreciating these traditional values. They think that this is all bogus, you know, [and they question the program team by asking that] how do you [know] that thing [or indigenous knowledge] really works? If it really worked then how come it has not been incorporated into global knowledge by now?" (Krishna Pidatala, personal communication, August 28, 2007).

In addition to the staff's supposed lack of appreciation or trust for indigenous knowledge, Prakash says that the concept of looking within one's own country for development solutions is a new concept for governments to discuss with international donors like the World Bank. Governments are used to the World Bank coming with new

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[188] This is because the philosophy and rationale behind indigenous knowledge did not fit into the dominant neoclassical and neoliberal development paradigms at the World Bank.

technologies and Western based ideas and are not expected to voice or share their own

indigenous development practices. Prakash says, "it requires a change in mindset"

(Siddhartha Prakash, personal communication, July 22, 2007) from both World Bank

staff and country governments. He says that the Indigenous Knowledge Program tried to

shift the development paradigm to include more bottom-up development work, however,

he says:

again you come [The World Bank staff who have] with Ph.D.s and [staff who have] 20
years in the Bank and working in silos. [Development] is just a way of doing business
(Siddhartha Prakash, personal communication, July 22, 2007).

World Bank staff are set in their way of working in development and find it

"inconvenient" (Sharon Watkins, personal communication, July 27, 2007) or time

consuming to change their way of doing their business. Prakash adds that World Bank

staff need to stop:

going down for a two-week mission and telling the client what to actually do [and he
believes they need to] stop and say let me hear what you want, let me hear what you can
do. These are our objectives…what knowledge do you bring into it?
This in turn, Prakash believes will also facilitate open dialogues with country government

members and they will be more willing to discuss their indigenous knowledge.

Watkins was surprised the World Bank did not change its development paradigm

during the Knowledge Bank vision and says:

I mean this is one of the things the Bank has been criticized for years, is just kind of
lending money and either it fits or it doesn't and that's not the Bank's problem, it's the
problem of the government or the community or whatever it is. But really when you're
lending that carries lots of responsibilities, so if the Bank was truly to follow through on
all of its lending projects it would make sure that the source where its money is going is
towards projects that are locally adapted and, therefore, contain elements of indigenous
knowledge (Sharon Watkins, personal communication, July 27, 2007).

2. Culture of the organization

The development paradigm is obviously linked to the culture of the organization and its mission and objectives. My informants indicated that this as another major challenge for indigenous knowledge at the World Bank.

Gorjestani was one of the main advocates for changing the development culture at the World Bank. He notes that if the culture does not change then the institution cannot reach its full potential of sharing knowledge in development. He has written a number of publications on this topic and coined the phrase that World Bank staff need to "change their mindset" (Gorjestani, 2007) towards development and to acknowledge the knowledge of the poor. Many of his staff, such as Prakash, use the same phrase "change their mindset" in describing their experience with staff at the World Bank.

Watkins believes the World Bank staff thought the knowledge initiatives were too disconnected from the institution's focus on operational work and, "very academic" (Sharon Watkins, personal communication, July 27, 2007). She thinks a stronger connection needed to be made because the Indigenous Knowledge program was considered as only:

reflecting on lessons learned, whereas the actual project work was about talking with governments, and getting documents signed and very bureaucratic procedures….so, [she] thinks they looked at programs like the IK Program as kind of as almost inconvenient because its one more thing they had to think about and weren't sure how to apply it to their projects (Sharon Watkins, personal communication, July 27, 2007).

She also did indicate that task managers[189] needed to be more proactive in seeking out indigenous knowledge of a country or community before implementing a project. She says that it should be a natural part of development work, "kind of like a university student you go about your research over a period of six months," (Sharon Watkins,

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[189] Task Managers manage World Bank projects

personal communication, July 27, 2007) or so and make sure the project you are working on is effective and locally adaptive.

Prakash, however, says that task managers found it difficult to seek out indigenous knowledge, research it for their project, and integrate it. He says:

for example, you look at any task team at the World Bank, they're overworked, they're very over burdened, they're managing 5-6 very high profile projects at a time, they're traveling a lot and working, you know, day after day, so they don't have time, even with the best of intentions, to give you [a member of the Indigenous Knowledge team] a half an hour for your ideas and listen to it, and understand it, and then find the space to incorporate it into their projects (Siddhartha Prakash, personal communication, July 22, 2007).

Therefore, the culture of the World Bank, which emphasizes efficiency and quantitative results in development work, provides limited opportunity for staff to thoroughly research projects before a operational mission or be able to holistically reflect on results or lessons learned.

3. Leadership issues

Leadership support was important for the Indigenous Knowledge Program. As mentioned earlier, Wolfensohn was a strong supporter of the program and personally acknowledged the program's publications and inaugurated indigenous knowledge related activities and events. Presidential support, in turn, was followed by regional support from the Africa region's Vice President. Although there was some skepticism about the validity of knowledge the program worked with, as Watkins mentions, staff at the World Bank, "did understand the importance of indigenous knowledge," (Sharon Watkins, personal communication, July 27, 2007) in their work.

The leadership and staff support was very important to Gorjestani as he managed the program. It made it easier for him to advocate for indigenous knowledge at the World Bank and he was also able to hire qualified staff to work on the topic. Therefore, in addition to the two permanent staff members who worked in the program, Gorjestani involved other staff in his Knowledge and Learning division to work on the topic. My informants, Watkins and Pidatala, are examples as they worked on other programs in Knowledge and Learning, however, also worked on indigenous knowledge related issues.

Support for the program, unfortunately, immediately declined upon change in presidencies. When Wolfensohn left and Wolfowitz became president, the institution's priorities also changed and the Africa region took new directions. As Pidatala notes, after Wolfowitz became president, "the World Bank has gotten out of the 'Knowledge Business'" (Krishna Pidatala, personal communication, August 28, 2007) and that, "IK is something that we don't mention these days here because...there is no support for it" (Krishna Pidatala, personal communication, August 28, 2007).

Prakash says that the Indigenous Knowledge program tried to regain leadership support, but acknowledges that:

it has to be taken forth very much at the leadership level, at the political level, so you can demand access and members of the World Bank need to better champion it to the staff and so forth. If its not there in the institution then it's going to be very difficult (Krishna Pidatala, personal communication, August 28, 2007).

Watkins adds that Gorjestani lost his managerial power and that staff working under him in the Knowledge and Learning division, which became the Results and Learning division, had to rework their skill sets. She says, "I'm a good example, I had...years of

experience doing what I was doing and I was asked to look at IDA[190] indicators" (Sharon Watkins, personal communication, July 27, 2007).

Gorjestani (2007) continued to advocate and tried to "manage" the program despite the changes in presidencies, however, he found it difficult. He says that clients continued to give him positive feedback on his work, but that, "the feedback inside the institution, particularly the Africa region, was not very positive."

Pidatala comments that Gorjestani's advocacy for the program was also not well received by others in the institution. He notes, "one of the key issues is that…the champion…in the Africa…[became solely] Nicolas Gorjestani, so at one point it got perceived as personality driven" (Krishna Pidatala, personal communication, August 28, 2007). This statement may hold true as Gorjestani became the only staff member advocating for indigenous knowledge and despite the program losing institutional support over the last few years, it only officially ended when Gorjestani retired on June 30, 2007.

4. Validation

World Bank staff and development practitioners also questioned the validity of indigenous knowledge. Watkins remembers:

having a conversation with someone where they were reflecting on the work of the Tanga AIDS Working Group and they said that they thought it was kind of scary that this group was allowed to continue doing its work because it hadn't been scientifically validated, at least from the West's perspective. So what kind of success could this project really be having, maybe it was just giving people false hope (Sharon Watkins, personal communication, July 27, 2007).

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[190] IDA is the International Development Association of the World Bank and helps the poorest countries with development aid. For more information see :
http://web.worldbank.org/WBSITE/EXTERNAL/EXTABOUTUS/IDA/0,,menuPK:51235940~pagePK:11 8644~piPK:51236156~theSitePK:73154,00.htm

Prakash also notes that:

there's a big uphill struggle and challenge to integrate indigenous knowledge because…they are essentially all community tested practices…and in a number of donor projects what you have is, you have health practitioners and others who have Ph.D.s and you know other expertise in their healthcare and they apply their own knowledge systems based on [Western] scientific validation. So they are very skeptical of traditional medicines, traditional healthcare, traditional knowledge coming into their domain and to test a new unknown area system. [and that]senior officials…immediately [ask] is it validated, you know or is it tested? Do you have NIH approval? Do you have WHO approval? (Siddhartha Prakash, personal communication, July 22, 2007).

Prakash, however, does acknowledge their concern because:

without scientific evidence it just, it falls flat. No one will go ahead with this without scientific validation because, you know, the risk is too high and likely, you know, in the global world with hundreds of people suing each other and so forth, no one's going to, you know, try out medicines…unless its published in journals of medical science and talks by the NIH or talks by the WHO (Siddhartha Prakash, personal communication, July 22, 2007).

Prakash says that it will take time for development practitioners to consider indigenous

knowledge on the same level as conventional knowledge because:

in the development mainstream [indigenous knowledge] is just entering…I think donors are resistant because governments are also resistant to the whole process because I think they are pressurized by, international agencies and international pharmaceutical companies, who have a very large presence in developing countries, so a very strong lobbying position (Siddhartha Prakash, personal communication, July 22, 2007).

Therefore, country government members hesitate advocating for their indigenous

knowledge because it is not validated according to Western Science.

H. Nomenclature

As mentioned before, the Indigenous Knowledge program used the terms

"indigenous knowledge," "traditional knowledge", and "local knowledge"

interchangeably. Although the rationale behind this may have been to facilitate the integration of indigenous knowledge into the World Bank's work program, the plurality of terms used to describe the knowledge the program addressed, and the lack of a clear understanding of the term indigenous knowledge, led to several problems and challenges.

For instance, the program used the term indigenous in a broader sense than the World Bank's Indigenous Peoples program. The common understanding of indigenous in and outside the World Bank, however, is more related to indigenous peoples. Pidatala acknowledges that this may have occurred because the term originated from work people did in South America. Therefore, he says at times, "people didn't understand it [indigenous knowledge]" (Krishna Pidatala, personal communication, August 28, 2007) from the Indigenous Knowledge Program's perspective.

Prakash says that the program tried to stay away from political discussions associated with indigenous peoples and broadly focused on knowledge. He says that:

our program specifically did not address indigenous peoples issues, particularly land rights, because you're entering a war zone, you know, between, you know, local communities and governments…we had a very practical, functional definition of indigenous knowledge – is local knowledge, is the thing that helps solve local problems, and that can be used for the wider development opportunity and population at large. And we decided to stay away from the controversy and the whole political dimension of land rights (Siddhartha Prakash, personal communication, July 22, 2007).

The fact that the program did not target indigenous peoples, and avoided the political issues associated with the identification of indigenous peoples, may have been confusing and misleading to World Bank staff regarding the aims of the program.[191] This was especially reflected in regard to the program's objective to mainstream the use of indigenous knowledge in World Bank operations because World Bank staff and clients

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[191] This is visible when studying the program's website. The program addresses different aspects regarding the application of indigenous knowledge but rarely highlights the political issues surrounding the knowledge holders and the rights they may carry with them.

may not be able to easily relate their work to the Indigenous Knowledge Program's objectives, especially if their work did not deal with indigenous peoples.

In Africa this is actually a major problem because the political debate about indigenous peoples in the continent is much less prominent than in Latin America and Asia. World Bank staff working in the Africa region may not have seen the applications of indigenous knowledge in their work.[192] This is especially important for the program because it is a demand-driven service and relied upon the interest and awareness of World Bank staff to integrate indigenous knowledge into their operational work.

Watkins also acknowledges other difficulties the term indigenous faced at the World Bank. She says:

I heard a few people say it's, a couple of times you know, relating indigenous to witchcraft, or whatever, it is or voodoo, [and that] you run into much trouble as far as people thinking indigenous has to mean you know of very rural settings, or people that don't really know what they're doing, that kind of a thing…therefore, some people thought of indigenous knowledge as the wrong wording (Sharon Watkins, personal communication, July 27, 2007).

Pidatala says that eventually:

the word indigenous became pretty controversial in the Bank [because] people started saying what is indigenous and what is not indigenous. So at one time the way this dilemma was basically resolved, we said lets…reword it as local knowledge (Krishna Pidatala, personal communication, August 28, 2007).

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[192] Particularly in Latin America, the debate about political, cultural and economic rights of indigenous peoples, generally considered to be the people living in the countries before colonization and also people that identify themselves as indigenous, has been ongoing for several decades. In African countries, populations cannot easily be distinguished between descendents of former colonizers and those who have originally lived in the region before colonization. This is one reason for the fact that the political debate in this region has just recently started and is limited to disadvantaged minorities such as the Pygmies in Central Africa.

Prakash overlooks this challenge and comments that it was a waste of time for the

Indigenous Knowledge Program to address what appropriate terminology should be used.

He criticizes other programs for solely spending their time on this challenge. He says:

there are other organizations, for example, the UNESCO Program on traditional knowledge, I mean their whole mandate debated the terms indigenous, traditional, and local, you know, so they have huge publications, debates, and seminars on should we call it indigenous knowledge, should we call it local knowledge, or should we call it traditional knowledge? At this stage, and in this day and age, this is too tiring an exercise. For political reasons people use the word indigenous, some people use the term traditional, the fact that they're talking about knowledge that are owned by local communities should solve their problems. They know it works, we know it works, so we need to acknowledge it and mainstream[193] it (Siddhartha Prakash, personal communication, July 22, 2007).

Furthermore, Watkins says that the debate and controversies surrounding the

terminology were often inappropriate and demeaning to the communities they worked

with. She says:

do we call what we use as our knowledge in the West, do we call it indigenous? Or do we call it traditional? So if our knowledge is, our knowledge, and our technology systems, etc., we wouldn't call it indigenous…(Sharon Watkins, personal communication, July 27, 2007).

She said that if we, in the West, do not have to clarify our knowledge into a label like

indigenous, why should we expect a community in a developing country to do so.

Therefore, a different term, such as, "locally adaptive knowledge or locally adaptive

development" (Sharon Watkins, personal communication, July 27, 2007) may better

clarify the program's focus on the application of knowledge for development.

Indigenous knowledge was also referred to as "IK" in abbreviation. This

acronym had caused some controversy when I interned with the program. Some World

Bank staff teased the manager, Nicolas Gorjestani, that "IK" is a just an extension of Nic

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[193] Or institutionalize

(Sharon Watkins, personal communication, July 27, 2007). It was also rumored that the Vice President of the Africa region disliked the program and promoting itself using the acronym IK. When I questioned my informants about this, they all avoided the topic or refused to comment on this issue. Pidatala after defining indigenous knowledge for me, only had this to say, "that's all I have to say…" (Krishna Pidatala, personal communication, August 28, 2007).

I. Future directions

The future for indigenous knowledge at the World Bank is limited and the current leadership's focus unfortunately does not include any space for indigenous knowledge. Watkins says that:

there's so many trends that are happening at the Bank from what I understand and Nicolas Gorjestani saw the role of the Bank as a knowledge, as an information broker. So, you know, given that role it made perfect sense that there would be an indigenous knowledge program, that there would be people sharing lessons of experience of what works and what hasn't and doing exchanges, but the, the current focus is not on that kind of reflection, its on you know, showing the statistics, showing the number of projects, showing the number of people who have been affected or not, so, it all depends on, I mean the financial resources of the institution are huge, so I don't see any reason why not, why they wouldn't devote resources to something like indigenous knowledge. But, I think the thinking right now is they're too pressed with kind of everyone's eyes looking at them to get the numbers you know following that the Millennium Development Goals, that no one sees that there is a luxury of time for reflection kind of a thing… because people don't see it much as this knowledge broker, they see it more as we're the kind of the supermen that are going to go and fix things (Sharon Watkins, personal communication, July 27, 2007).

Unfortunately, at the moment, Watkins says that:

all of the functions have definitely been sidelined… our group used to be the Knowledge and Learning Group, now it's the, RL, its results and learning. Learning is kind of a footnote. So, results and learning, how to get results is, kind of, sort of, understood how it's supposed to be. But the learning part is kind of has taken on a very different meaning…So, anything that was purely a learning product, so anything to do with sort of

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knowledge sharing, information dissemination was cut. The IK Program is no longer. And everyone that was doing work on those things [knowledge related activities] before, was asked to rework their skill set (Sharon Watkins, personal communication, July 27, 2007).

In addition, she says the opportunities for indigenous knowledge at the World Bank now are, "really just hard to say because it would depend on where the new management goes and what their thinking is…" (Sharon Watkins, personal communication, July 27, 2007). Pidatala adds:

unfortunately starting last year we have completely done away with you know, whatever support we were giving to IK or indigenous knowledge and incorporating it into the development effort. I mean now nobody talks about it, and nobody even wants to know about it. I mean this is pretty unfortunate…(Krishna Pidatala, personal communication, August 28, 2007).

Prakash is more optimistic and believes the program will come back. He says that:

there is a, for example, the Global Research Alliance and the World Bank [Indigenous Knowledge team] have started a private project to actually validate the work of the Tanga AIDS Working Group…and there are other projects, for example, in India, with a USAID donor funded project in the Southern State of Tamil Nadu…working with traditional healers to treat HIV/AIDS in the context of the National AIDS programs for the state (Siddhartha Prakash, personal communication, July 22, 2007).

The future direction of these "private projects" is, however, uncertain without the managerial support of Nicolas Gorjestani.

When I asked Watkins whether the program would re-emerge she said:

it all depends on what resources are available, it all depends on where the leadership decides its priorities are. So if Zoellick now again follows the trend of Wolfensohn, and thinks that knowledge is important, and if he sort of set that precedent again then indigenous knowledge could thrive again. Definitely, I mean, I see these kinds of programs in other organizations, maybe NGOs, Non-Profits, etc., so I mean, you know, this stuff goes on in most organizations. So one would think that given that the World Bank is the most wealthy of all these organizations, that it would be the one organization to have the luxury to do that kind of thing (Sharon Watkins, personal communication, July 27, 2007).

Pidatala believes that indigenous knowledge will probably take a while to re-enter

into work programs at the World Bank. He says:

again a lot of it is traditional knowledge that one sees…in the areas like…in human development areas…I see outside the Bank that there is still a strong movement and people are working on it so I can see that it will not go away. But, its again in cycles. So maybe it might be another ten years or more before it really comes back. On the Bank's side what we are doing is that we are focusing more and more on what we all infrastructure projects…my understanding is that the Bank would like to leave Human Development issues to others…like even the Bill Gates Foundation (Krishna Pidatala, personal communication, August 28, 2007).

J. Conclusion

Although the Indigenous Knowledge Program succeeded in institutionalizing

indigenous knowledge into some development projects at the World Bank, it also had

major challenges, which were very difficult to overcome. These challenges include the

conventional development paradigm, culture of the institution, issues in nomenclature,

validation of indigenous knowledge, and issues in leadership. The small-scale nature of

the program associated with it's challenges could not make an institutional impact at the

World Bank. Therefore, the Indigenous Knowledge program had minimal institutional

change despite it being associated with World Bank strategies such as PRA techniques.

The program officially ended on June 30th, 2007, the day the manager of the

program, Nicolas Gorjestani, retired. The future directions and re-emergence of the

program at the World Bank remain limited in scope as the leadership at the World Bank

is directing the institution away from the Knowledge Bank vision and towards achieving

tangible results, such as that seen in building infrastructure. My informants did indicate

the institution operates in cycles and acknowledge that work on indigenous knowledge is strong outside the Bank. Therefore hopefully in the next decade or so the Knowledge Bank vision and an Indigenous Knowledge Program (maybe under a new name or framework) may return to the World Bank.

VI. Penn State University

A. Introduction

Integrating indigenous knowledge at the university level is important in transforming teaching, learning, and research in the academy. Pennsylvania State's Interinstitutional Consortium for Indigenous Knowledge is a consortium operating through Penn State's College of Education and strives to introduce knowledge outside conventional or Western based knowledge into the academy. The directors of the consortium have created activities to raise awareness of indigenous knowledge to faculty (and others working in academia), institutionalize indigenous knowledge into Penn State's academic disciplines, and encourage faculty from various disciplines to conduct independent and collaborative research (with local communities) using indigenous knowledge. This chapter presents the third case study in this research - Penn State's Interinstitutional Consortium for Indigenous Knowledge and discusses the consortium's efforts to institutionalize indigenous knowledge at Penn State and the consortium's opportunities and challenges in working with indigenous knowledge.

B. Background

This section details the background of the University and department the case study is housed in and includes: 1) Penn State History; 2) College of Education; and 3) Informants.

1. Penn State history

Pennsylvania State University (Penn State) was founded in 1855 as an agricultural college and is Pennsylvania's largest Baccalaureate degree source. Penn State's mission is to improve the, "lives of the people of Pennsylvania, the nation, and the world through integrated, high-quality programs in teaching, research, and service."[194] Their instructional mission includes undergraduate, graduate, and continuing and distance education in the areas of natural and applied sciences, social sciences, arts, humanities, and professional schools (including medical and law).

Penn State is classified as a land-grant university and has twenty-three campuses spread throughout the state (L. M. Semali, Grim, B. J., and Maretzki, A. N., 2006).[195] The main campus is located in the center of the state in State College. Since it is a land-grant university, Penn State holds itself responsible for outreach and public service to the citizens of Pennsylvania.[196] The university, therefore, has collaborative activities with industrial, educational, and agricultural projects in the state and also works with similar sectors globally.

2. College of Education

The Interinstitutional Consortium for Indigenous Knowledge (ICIK) operates through the College of Education and the director/founder of the consortium is a faculty member in the College of Education.

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[194] See http://www.psu.edu (Last accessed February 21, 2008).
[195] Some campuses have specialized roles such as the Penn State Milton S. Hershey Medical Center, but overall all the institutes have a common mission (Penn State website).
[196] See http://www.psu.edu/ (Last accessed February 21, 2008)

Penn State's College of Education is one of the top colleges in the United States and their departments include: Learning and Performance Systems; Counselor Education, Counseling Psychology, and Rehabilitation Services; Curriculum and Instruction; Education Policy Studies; and Educational and School Psychology and Special Education.[197] The director of ICIK, Ladi Semali, is a professor in Curriculum and Instruction.

3. Informants

I interviewed three informants at Penn State: Dr. Ladi Semali, Dr. Audrey Maretzki, and Dr. Durate Morias. Ladi Semali (Semali), who has a Ph.D. in Comparative and International Education from UCLA, is the director of the indigenous knowledge consortium. He created the consortium based on the frustration he felt between his indigenous roots and his career as a academic. He is originally from Tanzania.

Dr. Audrey Maretzki (Maretzki) is a professor emeritus in Food Science and Nutrition. Her research focuses on gender and nutritional issues in Africa. She met Semali through a common friend they had in the College of Education. She currently co-directs the indigenous knowledge consortium with Semali.

Duarte Morais (Morais) is an associate professor in the department of Recreation, Park and Tourism Management. His research focuses on gender, ethnicity and power issues in sustainable tourism. He is a member at large of the indigenous knowledge consortium.

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[197] See http://www.ed.psu.edu/educ/ (Last accessed February 21, 2008)

C. Interinstitutional Consortium for Indigenous Knowledge

The Inter-Institutional Consortium for Indigenous Knowledge (ICIK) was developed in 1995. ICIK is referred to as the "only academic Indigenous Knowledge Resource Center in the U.S.,"[198] and is affiliated with 35 other indigenous knowledge centers around the world. Although the center exists as a joint collaboration between the Colleges of Education and Agricultural Sciences (co-directed by Ladi Semali and Audrey Maretzki), the initial inspiration, as mentioned earlier, for ICIK came from Ladi Semali's frustration towards dominant Western knowledge and the general lack of global appreciation for knowledge existing in developing countries.

ICIK is located "in the office of the Associate Dean for Outreach, Technology and International Programs in the Penn State's College of Education."[199] Below is a detailed presentation of ICIK's mission, its formation, the consortium's funding sources and support, and its general activities.

1. ICIK's mission

ICIK's mission is to promote, "communication among community residents, students, university faculty and staff from across the Commonwealth of Pennsylvania who share an interest in diverse local knowledge and would like to engage with communities that generate locally-useful knowledge to enable their survival in a rapidly globalizing society."[200] Semali believes that ICIK is:

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[198] See http://www.ed.psu.edu/icik/ (Last accessed February 21, 2008)
[199] See http://www.ed.psu.edu/icik/ (Last accessed February 21, 2008)
[200] See http://www.ed.psu.edu/icik/ (Last accessed February 21, 2008)

an open forum where people can talk freely about their experiences in indigenous knowledge with indigenous communities, and their readings or writings or visions about the indigenous experiences about medicine, about education, about geographic, about astrology, about oceanography, just about any subject… (Ladi Semali, personal communication, August 9, 2007).

Maretzki adds that the consortium provides, "opportunities for people to learn from others, not necessarily to quote learn from the experts..." (Audrey Maretzki, personal communication, August 8, 2007). Furthermore, Maretzki says that through ICIK Semali and she are investigating a, "natural kind of a process of wanting to know about what has worked in other places" (Audrey Maretzki, personal communication, August 8, 2007) because knowledge or solutions to development, healthcare or other areas cannot be generated through cookie cutter recipes generated in the laboratory. Maretzki comments that, "the problem that I have with that, not that it isn't valuable knowledge, but that it isn't necessarily going to work other places" (Audrey Maretzki, personal communication, August 8, 2007).

2. History and formation of ICIK

Semali grew up on the slopes of Mount Kilimanjaro, in the village of Chaggaland, and he recalls how, because of colonization and colonial schooling, the local people lost their own knowledge and became dependent on their British colonizers (McGarvey, 1997). After he came to the U.S., Semali says he developed an inner struggle between his indigenous roots and being an academician (a teacher and scholar) in the U.S.

Semali channeled his frustration and tension to "passion and courage" (Ladi Semali, personal communication, August 8, 2007) by creating ICIK and bringing discussions of indigenous knowledge into the academy. Semali created the consortium

for academicians to discuss knowledge outside conventional knowledge and bring attention to their place-based knowledge, or worldviews, which they bring with them to the academy.

Maretzki recalls that the center had a strong start and took off in a good direction. For instance, they had much initial external support. Maretzki says, "[Semali] had some contacts at…the World Bank, and I had some at USAID and we both knew about Mike Warren's work and we invited him here to meet with some faculty and help us get an indigenous knowledge center started here [at Penn State]" (Audrey Maretzki, personal communication, August 8, 2007).

The late Michael Warren started the first indigenous knowledge resource center in the U.S. and his research interests focused on the application of indigenous knowledge to agriculture. Therefore, he connected well with Maretzki, who was at that time affiliated with the College of Agricultural Sciences, and he wanted to help Penn State start their own indigenous knowledge resource center. Maretzki says that therefore, "[Michael Warren] came here in 1995, and we managed to get some funds to bring him here, and that was really the beginning of an indigenous knowledge center here…" (Audrey Maretzki, personal communication, August 8, 2007)

When I asked Semali and Maretzki why they wanted the center's headquarters to be at Penn State, as opposed to Semali's hometown, Chaggaland, or another non-Western country, both Semali and Maretzki did not have a specific reason. They simply acknowledged that this was an "interesting question." Maretzki adds that though, "I don't think we ever really asked ourselves, you know, why Penn State? It was just that

we were both here and were interested in getting something started" (Audrey Maretzki, personal communication, August 8, 2007).

3. Support and funding for ICIK

ICIK has received more external funding than it has internal funding (within Penn State). Maretzki, however, notes that Semali and she, "really didn't go for external funding until 2004, when we were setting up the conference, the international conference" (Audrey Maretzki, personal communication, August 8, 2007). Semali and Maretzki seek funding or financial support for ICIK based on the activity they are planning. Different funding sources support each of the following activities – conferences, working groups, site visits to local communities, and the seminar series.

For example, Semali invited some Penn State Faculty, who are interested in indigenous knowledge to visit him at Tumaini University (in Tanzania) when he was on sabbatical there. The Penn State faculty visited local projects, having indigenous knowledge components, and established many collaborative projects with local communities. For this site visit, partial funding was provided by the Tumaini University, Penn State's Children, Youth, and Families Consortium (CYFC), the Marjorie Grant Whiting Center for Humanities, Arts, and the Environment,[201] Penn State International Programs Office, and individual academic departments and colleges.

As another example, ICIK's international conference, *Indigenous Knowledge: Transforming the Academy*, which was held in 2004, received funding from an Outreach Innovations Grant, in addition, to $80, 000 from various external financiers, such as the

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[201] Provided money for the rural communities

Kellogg Foundation, USDA/Agricultural Research Service, and the National Science Foundation.

Maretzki adds that, "mostly external funding [came] from places where we already had, where someone was already aware of the international interests and they knew something about our center by that time…" (Audrey Maretzki, personal communication, August 8, 2007). For example, she adds that she has:

known people at Kellogg for a long time…I also had some contacts at the Agricultural Research Service in Washington D.C.…through the College of Education we made a contact with the National Science Foundation…[and] through the Margery Grant Whiting Foundation, where I had a contact" (Audrey Maretzki, personal communication, August 8, 2007).

As with many centers or consortiums, operating through universities, like ICIK, they depend on financial support from a variety of organizations and foundations. In the case of ICIK, Semali and Maretzki have been able to generate financial support through their various established contacts. Below is a table of the various organizations and foundations which financially support ICIK:

Table 6.1: Summary of Funding Sources for ICIK

Grant Provider	Mission
W.K. Kellogg Foundation, Food and Society Program	The W.K. Kellogg Foundation supports children, families, and communities as they strengthen and create conditions that propel vulnerable children to achieve success as individuals and as contributors to the larger community and society (W.K. Kellogg Foundation, 2007).
United States Department of Agriculture, Agricultural Research Service	The Agricultural Research Service (ARS) is the U.S. Department of Agriculture's chief scientific research agency. Our job is finding solutions to agricultural problems that affect Americans every day, from field to table (Agriculture Research Service, 2007).
National Science Foundation, Arctic Science Program	The Division of Arctic Sciences in the Office of Polar Programs (OPP) supports scientific research in the Arctic, related research, and operational support. Science programs include disciplinary, multidisciplinary, and broad, interdisciplinary investigations directed toward both the Arctic as a region of special scientific interest and a region important to global systems. Disciplinary interests encompass the atmospheric, biological, physical, earth, ocean, and social sciences. The Arctic System Science Program provides opportunities for interdisciplinary investigations of the Arctic as a system. OPP also encourages research relevant to both polar regions, especially glaciology, permafrost, sea ice, oceanography, ecology, and aeronomy (Indigenous Knowledge Program, 2007; National Science Foundation, 2007).
World Bank Knowledge and Learning Center, Africa Region	The objectives of the IK for Development Program are to help the development community to learn more about the indigenous/traditional practices in local communities so as to better adapt global knowledge to local conditions, and to design activities to better serve the community needs (Indigenous Knowledge Program, 2007).
Marjorie Grant Whiting Center for Humanity, Arts and the Environment	Nonprofit org dedicated to honoring the life and work of the anthropological nutritionist and ethnobotanist (Marjorie Grant Whiting Center for Humanity, 2007).
Canadian Department of Foreign Affairs and International Trade	Supports Canadians abroad and promotes Canadian culture. Encourages a peaceful and

	secure world (Canadian Department of Foreign Affairs and International Trade, 2007).
Penn State Outreach	Outreach activity through Penn State University.
Penn State College of Education, College of Art and Architecture, College of Agricultural Sciences, International Programs Office, College of Health and Human Development, Department of African and African-American Studies, and the Arts and Health Outreach Initiative	Support from various colleges and academic programs at Penn State.

4. Collaborations

ICIK collaborations occur both within and outside of Penn State. For example, at Penn State Maretzki says that ICIK has collaborations with the law school regarding research on intellectual property rights issues and collaborations with the medical school on traditional medical research. She says other collaborations include programs on, "Earth Sciences, Engineering, and Development in Africa… [and the] African American Studies Program…" (Audrey Maretzki, personal communication, August 8, 2007). She hopes that in the future ICIK can have collaborations with more colleges and programs, for example, she says:

Penn State now hosts Borlong Fellows, this is the African women in the science program, and…we hosted the first group in the Spring and we're hosting another group in the Fall. So we'll probably be hosting two groups a year. They're all African women and many of them are from the countries that we're interested in (Audrey Maretzki, personal communication, August 8, 2007).

Semali says ICIK tries to work closely with colleges of, "health and human development, agricultural sciences, education, engineering…arts and architecture,

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information sciences… [and] geography," (Ladi Semali, personal communication, August 8, 2007) as they see the most connection and opportunities for research in these disciplines. As Maretzki says, however, "it's like pulling teeth" (Audrey Maretzki, personal communication, August 8, 2007) sometimes, as faculty often do not see the value of indigenous knowledge in their work.

D. Main activities

The directors of ICIK have created a number of activities over the last decade to institutionalize[202] indigenous knowledge at Penn State. Their activities include, maintaining a listserv[203], website, and a resource library, holding monthly seminars, hosting conferences, conducting workshops, and producing books on the topic of indigenous knowledge.[204] Maretzki says that the:

first thing [ICIK did] was the conferences and the book, some of the publications…we've been presenting at a number of meetings, international and national, and then a few years ago, the website went up, partly in response to the conference because we have the proceedings from the conference on the website…(Audrey Maretzki, personal communication, August 8, 2007).

In addition, mainly through their working group, they conduct collaborative research with local communities. In their research, they like to emphasize the "in-reach" aspect where local communities contribute their indigenous knowledge to the academy.

Semali says that ICIK's activities are, "not necessarily international only, but also within Pennsylvania" (Ladi Semali, personal communication, August 8, 2007).

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[202] Institutionalize in this case study means integrating indigenous knowledge into academic disciplines or on-going faculty research.

[203] Membership to the listserv is not limited to Penn State
[204] See http://www.ed.psu.edu/icik/ (Last accessed February 21, 2008)

Therefore, the center has not only activities/program operating around the world (mainly in Africa)[205], but they also work in their backyard – in Pennsylvania. Semali adds, "it's the best place you can be about rural development…" (Ladi Semail, personal communication, August 8, 2007).

Below presents the major activities that operate out of ICIK: 1) Seminars and conferences; 2) Publications; 3) Website; 4) Research; 5) Courses; and the 6) Working Group.

1. Seminars and conferences

The directors of ICIK conduct monthly seminars and have held two conferences over the last decade. Semali says that through the monthly seminars, ICIK shows that it is "possible to bring community people [to Penn State]…[and] that you don't need admissions [or] regulations to be able to bring community people to the academy [and] to learn from them" (Ladi Semali, personal communication, August 8, 2007). Monthly seminars are open to all and are held on Penn State's campus.

They follow the same philosophy in the conferences they host. They make sure that local communities also participate in conferences so that they have opportunities to speak about their indigenous knowledge first hand. Semali says that for the 2004 conference they had eight indigenous community members from Alaska attend. They also accepted speakers who did not have conferences papers. Semali says, "there are other ways to deliver. So the arts become one of the avenues to open up" (Ladi Semali, personal communication, August 8, 2007). For example he notes that indigenous knowledge can be presented through artifacts or tapestry. Past conferences include: the

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[205] Mainly because of Semali's heritage and Maretzki research interest

2004 *Indigenous Knowledge: Transforming the Academy*, May 27-28, 2004; *Indigenous Knowledge: Critical Perspectives in Postcolonial & Postmodern Discourses*; the 1997 *International Consortium for Indigenous Knowledge (ICIK)*, April 18-19, 1997; and the 1996 *Indigenous Knowledge Conference* at Penn State, 26-27 April.

Semali says that indigenous knowledge is mainly integrated or a part of Penn State activities through conferences and seminars run through ICIK. For example, a number of conferences have been held at ICIK and the conference proceedings have been posted on the website. Also, many research collaborations have formed as a result of the conferences.

Since the seminar series is more frequent than the conferences (they occur monthly), more indigenous knowledge is institutionalized or integrated into faculty research via seminars. Seminars are diverse in their topics and regions, and include speakers from outside the academy. An example seminar is Challenges and Opportunities for Amazon forest-based communities presented by Dr. Campbell Plowden who is the founder and President of the Center for Amazon Community Ecology. In his presentation, he discusses challenges local communities in the Amazon face in preserving their culture and how they use indigenous strategies to overcome these challenges.[206] All speakers' presentations are uploaded to the website after the seminar (Audrey Maretzki, personal communication, August 8, 2007). Below is a table listing the seminars ICIK held in 2007.

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[206] See http://www.ed.psu.edu/icik/ (Last accessed on February 21, 2008)

Table 6.2: Summary of ICIK Seminars

Seminar	Date
An Emerging Scholarship of Cross-Cultural Engagement	November 28, 2007
Agroforestery and Natural Resources Development in Uganda and Mali	October 24, 2007
Exploring Indigenous Ways of Knowing among the Ojibwe	September 26, 2007
Thirteen Indigenous Grandmothers	April 25, 2007
A Community-Academic Project in Tanzania	April 17, 2007
The Gift of Spider Woman: Communication in Navajo Weaving	March 28, 2007
Greening the Dragon: Environmental Imaginaries at work in China's Contemporary Science, Technology, and Governance	February 28, 2007
The Millennium Villages Project: Nutrition and Health	February 12, 2007
Challenges and Opportunities for Amazon Forest-Based Communities	January 31, 2007

Maretzki says that seminars are generally held over lunch time and attract faculty, graduate students, undergraduate students, and people from outside Penn State. The general attendance at each seminar is about 25 people and Maretzki adds that attendance is taken, "at every ICIK seminar and we put them [attendees] on the mailing list…" (Audrey Maretzki, personal communication, August 8, 2007) or on the ICIK listserv. She adds that seminars are attended mainly by those interested in the topic, for example, she says, "we've got something that's about indigenous knowledge in China, we'll get some Chinese [attendees]…we'll also get people who are interested in China" (Audrey Maretzki, personal communication, August 8, 2007).

Seminars are advertised through various Penn State listservs, including ICIK's listserv, and flyers are sent to various departments. Maretzki says that special invitations

are also sent to faculty or others who may be especially interested or doing research in the topic. She says, "if the person is from, is doing something that they think might be of interest to students in anthropology department," (Audrey Maretzki, personal communication, August 8, 2007) they advertise the seminar more in that department.

2. Publications

The publications produced by ICIK were the impetus for the conferences. The publications include, *What is indigenous knowledge? Voices from the academy; Education, modern development, and indigenous knowledge: Analysis of academic knowledge production;* and *Heartbeat of indigenous Africa: A study of the Chagga educational system.* These books feature papers of contributing authors from Penn State and other institutions.

Semali and Maretzki have also published their research on indigenous knowledge in various journals. Their most recent publication is titled, "Barriers to the Inclusion of Indigenous Knowledge Concepts in Teaching, Research, and Outreach" in the *Journal of Higher Education Outreach and Engagement.* This research investigates Penn State faculty's understanding of indigenous knowledge, determines whether they use indigenous knowledge in their research, and the barriers of the integration of indigenous knowledge in the academy.

3. Website

ICIK also has a website, which includes a bulletin board listing events and information sent out to members on the listserv. Maretzki says that the website helps

them communicate information about the seminar series. The website also showcases a video entitled *The Many Meanings of Indigenous Knowledge*.

Maretzki credits the website to a Ph.D. graduate student, from the College of Education, who helped them to design and maintain the website. Since Maretzki and Semali sometimes become preoccupied in their other tasks with ICIK, they try to apply for a work-study student ever semester to help them with tasks like the website and other administrative issues.

4. Research

ICIK's mission in outreach coincide with Penn State's mission in outreach in addressing the local people (locally and globally). ICIK's mission, however, includes an "in-reach" aspect to their research. As Semali notes, in-reach involves:

opening spaces for community to come and teach at the academy. The most ivory-tower universities, you know, would not even think that you know, they think it's unthinkable (Ladi Semali, personal communication, August 8, 2007).

Ultimately, in-reach and out-reach involves, "partners [the academy and local communities] being respectful of each other's domain of knowledge, ways of knowing" (L. M. Semali, Grim, B. J., and Maretzki, A. N., 2006). Maretzki adds:

well, you know universities have in for a lot of different reasons put a lot of energy in recent years into the concept of outreach…my whole career has been in at some level involved with quote outreach…[and] the outreach is a matter of taking the knowledge from the university to the community; it's not a matter of taking the community knowledge to academia. So I've been trying to say that what we need to do is figure out models to balance in-reach and outreach. But, of course the term in-reach is not a term, since we're playing with words, everyone wants outreach, my work [to be recognized]…(Audrey Maretzki, personal communication, August 8, 2007)

5. Courses

Courses are also offered through ICIK to both Penn State students and those interested outside the university. Depending on the subject, the courses are taught by professors from Penn State or local community members themselves. Semali says, "right now we do have a cultural course…about Ojibwe…its every Spring and does run through ICIK" (Ladi Semali, personal communication, August 8, 2007). Semali adds that although his courses are not labeled as indigenous knowledge, they always contain indigenous knowledge topics in them. He says:

I [also] have two courses here on indigenous knowledge…I teach a course in participatory research, another course is in comparative and international education, and there's a component of indigenous knowledge there…and then there's also another course on cross cultural research methods, and there I also have the component, very strong, very big component of indigenous knowledge, so the course I teach [has] indigenous knowledge embedded in it. It doesn't matter what I teach (Ladi Semali, personal communication, August 8, 2007).

6. Working Group

In the Spring of 2006, the directors of ICIK created an Interdisciplinary Working Group focusing on the topic of indigenous knowledge and development. The group works with institutions and rural communities in countries of Tanzania, Kenya, and Uganda, to work on achieving the Millennium Development Goals using indigenous knowledge. Semali says that their working group is unique because they have been able to pull:

together expertise system-wide, which is in the discipline that to tackle specifically the problems or issues. And in this case, our working group, our current working group, focuses on the Millennium Development Goals (Ladi Semali, personal communication, August 8, 2007).

Maretzki says that, "the working group has a lot of connections to the [program manager at the] World Bank" (Audrey Maretzki, personal communication, August 8, 2007) as he was the one who helped Penn State start the initiative. She says that early 2006 they invited the World Bank's Indigenous Knowledge Program manager:

back here [to Penn State] for several days and we organized an opportunity for him to meet with a number of people who had an interest in specifically the relationship [between] indigenous knowledge and development [and that] his and the World Bank connection was really [important], when we decided to get a working group focused on indigenous knowledge and development…specifically surrounding the Millennium Development Goals (Audrey Maretzki, personal communication, August 8, 2007).

In further development of the working group, Maretzki says they organized videoconferences between the different members of the group (videoconferencing was convenient since members were spread out geographically) and, "through a series of discussions [we] decided that we were going to focus on East Africa" (Audrey Maretzki, personal communication, August 8, 2007).

Semali decided to take his sabbatical at Tumaini University in Tanzania for the 2006-2007, school year and through additional funding, the working group was able to visit him and the local projects in Tanzania. Maretzki says that:

the group that went to Tanzania…[were] from the medical school, the law school, two people from the medical, one from the law school, and then two more of our branch campuses, and the College of Health and Human Development, the College of Agricultural Sciences, Education, Women's Studies, which is liberal arts, here at University Park (Audrey Maretzki, personal communication, August 8, 2007).

Therefore, the working group was quite diverse covering many disciplines. In Tanzania Maretzki adds that Semali had:

identified a counter-part for each of these people, a disciplinary counter-part, someone involved in the same area…and we worked on a pretty extensive agenda for [a] three day

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workshop in Moshi, [Tanzania] (Audrey Maretzki, personal communication, August 8, 2007).

Maretzki worked on the organization and logistics from University College and Semali organized things in Tanzania. Now they are both working at University College to follow-up on the findings and outcomes from the working group's trip. In fact on the 7th of September, the group reconvened to discuss future proposals and funding opportunities. Maretzki says that, "right now…there's a lot of energy into this working group" (Audrey Maretzki, personal communication, August 8, 2007).

E. Indigenous knowledge – definition, indigenous peoples, and nomenclature

1. Definition

ICIK formally defines indigenous knowledge as, "an emerging area of study that focuses on the ways of knowing, seeing, and thinking that are passed down orally from generation to generation and which reflect thousands of years of experimentation and innovation in everything from agriculture, animal husbandry and child rearing practices to education; and from medicine to natural resource management."[207] This definition is quite broad, however, it does emphasize the locality of knowledge (geographically) and that it is validated based on its use in the local environment and by generations of local community members.

Despite Semali and Maretzki formally defining indigenous knowledge through ICIK in this way, Semali says, "I don't think anyone can define indigenous knowledge, I don't think so…" (Ladi Semali, personal communication, August 8, 2007). He prefers "describing" the knowledge which can be considered indigenous. He says that when he

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[207] See http://www.ed.psu.edu/icik/ (Last accessed on February 21, 2008)

sent out a call for manuscripts for the book *What is Indigenous Knowledge? Voices from the Academy*, he asked contributors to:

not give me a definition, but to give me a succinct description of what indigenous knowledge is. To give me examples of where indigenous knowledge is practiced. And to provide us with names, artifacts, and the objects that point to what is indigenous knowledge rather than define indigenous knowledge (Ladi Semali, personal communication, August 8, 2007).

Maretzki says that Semali and she only formally decided to define indigenous knowledge a few years ago. She says they needed to formally define it for a number of reasons including reviewers from journals asking them what body of knowledge they are addressing and distinguishing themselves from, "knowledge that was generated by the first peoples who inhabited an area," (Audrey Maretzki, personal communication, August 8, 2007) so that they could emphasize that their work focuses on knowledge:

generated in place – knowledge out of an understanding of the conditions in whether they were the social, political, or economic, or agro-economic, or environmental conditions in a particular location…as opposed to being generated in a laboratory where you were trying to look at applications across a lot of different settings (Audrey Maretzki, personal communication, August 8, 2007)

Both Semali and Maretzki mentioned that indigenous knowledge is very local and may be irrelevant or inapplicable in other settings. Maretzki says, "its not knowledge that is necessarily going to be transported from place to place" (Audrey Maretzki, personal communication, August 8, 2007). This philosophy ties to Geertz's (1983) conceptualization of local knowledge. He notes that knowledge cannot be generalized to every context or transferred from one location to another, but rather it is context specific and deeply connected to its surrounding environment or origin (Geertz, 1983).

Therefore, Semali and Maretzki believe there is limited opportunity for up scaling or mainstreaming[208] indigenous knowledge – it is only really valuable and useful in the local setting.   The opportunities they see for indigenous knowledge is in the context of participatory research[209] where local community members decide on the "applicability and transferability" (Audrey Maretzki, personal communication, August 8, 2007) of knowledge to their local settings. Maretzki adds that participatory research provides:

opportunities for people to learn from others [using indigenous knowledge in their communities], not necessarily to quote 'learn from the experts'… [and this is done] with respect for each others voices...[and] that to me is very important. It isn't like your going into a community where indigenous knowledge already exists and you are imposing, but I think every group likes to know what other people are doing… (Audrey Maretzki, personal communication, August 8, 2007).

Therefore, exchange of knowledge with local community member participation is respectful and again emphasizes the local characteristic of indigenous knowledge.

Morias agrees that indigenous knowledge is context-specific. He says that the field of tourism, "is anchored on the local culture, local affairs, local foods, local landscapes, and how people interact with those landscapes. So its intrinsically related to indigenous knowledge…" (Duarte Morias, personal communication, October 6, 2007). He adds that in tourism they use the term authenticity to describe indigenous knowledge and ethnic to describe the people who hold indigenous knowledge:

because there's actually an important author that coined the term ethnic tourism and he referred to it as tourism where tourists are visiting a place to look at people that are culturally distinct or that have a close connection with nature" (Durate Morias, personal communication, October 6, 2007).

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[208] In other words, transferring indigenous knowledge from one setting to another or to different context/environment
[209] Participatory research involves local communities' members identifying their indigenous knowledge and determining its applicability in their community's development.

It is also important to note that Semali and Maretzki describe indigenous knowledge as "knowledges" as they feel this term address hierarchies seen within systems of indigenous knowledge. They note that within indigenous knowledge there is knowledge, which are more dominant, therefore, by saying "knowledges" they address the pluarity and diversity of knowledge within the indigenous knowledge framework. Semali and Maretzki have created a model addressing the hierarchies within indigenous knowledge and it will be published in a future publication.

2. Indigenous peoples

Both Semali and Maretzki indicate that their center of indigenous knowledge is not limited to indigenous people. Maretzki says, "to me indigenous peoples is a different topic and there we get into a whole number of different things…" (Audrey Maretzki, personal communication, August 8, 2007). Semali agrees and says, "it's confusing at many, very, very, different levels" (Ladi Semali, personal communication, August 8, 2007).

For example, Maretzki says:

Pennsylvania has no Native Americans; we're one of the few states that doesn't have any Native American tribal lands, for instance. You certainly can't, call the Amish indigenous, in the sense of indigenous people, they are not indigenous peoples, but they have a great deal of indigenous knowledge, they have knowledge that they have generated in place so, for us, indigenous means much more locally generated than it does associated with a particular group of people (Audrey Maretzki, personal communication, August 8, 2007).

Maretzki, however, does note that ICIK also works with groups labeled as Indigenous Peoples. She describes a project in Minnesota:

for instance, in Minnesota…this friend…Craig Hassel, he's at the University of Minnesota, and he's working with Native Americans at a number of Native American colleges… as a part of something called the Woodlands Wisdom program. So, there he's working with a specific group of indigenous peoples [laughs]…we work very closely together, but that's not where we're at (Audrey Maretzki, personal communication, August 8, 2007).

Therefore, in ICIK's definition of indigenous knowledge, it is believed that indigenous knowledge exists outside indigenous peoples, however, does not exclude itself from working with groups of people labeled as indigenous.

3. Nomenclature

Similar to the World Bank's Indigenous Knowledge Program, ICIK also uses the terms indigenous, local, and traditional interchangeably. Maretzki says that this was mainly done as many faculty and other researchers at Penn State may not see "indigenous" a part of their research or work. Therefore, using local and traditional expands their audience as people may feel local or traditional knowledge are important in their work.

Maretzki says ICIK began, "at a time when the center on indigenous knowledge at Iowa State was at its peak" (Audrey Maretzki, personal communication, August 8, 2007). Iowa's center and others around the world were using indigenous knowledge in their titles at that time, so ICIK joined their bandwagon. Semali acknowledges that:

there were several terms used for indigenous knowledge [at that time]. TDK, is one of them, which is the traditional development knowledge, and then there is indigenous knowledge, then there's place based knowledge, and then there's several others, and if you go to the book that was written by Mike Warren and he collaborated with someone over at I think its in England, I think its at Sussex, or the other one, I don't remember, and in that book, all these definitions were in there, so when I looked at that book, I simply said to myself, you know look, I have to commit to one set of concepts, to one set of where we can define the concepts using indigenous knowledge. That's how it came

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out and in my book, and we took information from a lot of people. But, later on in our development here at Penn State, the term indigenous knowledge was challenged …[but] of course all we knew was that word [at the time of ICIK's formation]…(Ladi Semali, personal communication, August 8, 2007)

They invited the late Michael Warren to Penn State to, "help us set [ICIK] up" (Ladi Semali, personal communication, August 8, 2007). Unfortunately, shortly after his visit to Penn State, Michael Warren passed away. Maretzki says that, "the last word" Warren used to describe these forms of knowledge was indigenous, therefore, in memory of Warren ICIK kept using the indigenous. Maretzki says that:

at that place and time what we were attempting to do, we didn't know the whole system was going to fall apart [in the trend of calling these knowledge systems indigenous], sort of as quickly as it had, but we felt that this was something that there was a growing interest in and that it would be appropriate for us to be associated with those centers around the world. And, well, I don't think its hurt us… [but] I'm not sure we would do it again [use the term indigenous] (Audrey Maretzki, personal communication, August 8, 2007).

When I asked about the acronym 'IK,' Semali says it is used as a matter of convenience, "acronym-naming, acronyming, acronyms are part of our everyday life, so that's we came up with [ICIK]…it came along easy [in use] for ICIK…" (Ladi Semali, personal communication, August 8, 2007). In addition, he says, just like indigenous knowledge, IK "was already out there…from the head of this thing NUFFIC[210]" (Ladi Semali, personal communication, August 8, 2007).

Maretzki adds that during the formation of ICIK, most centers, "had IK somewhere, they might be CIKARD, which is the Iowa State one, KENRIK, which was

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[210] NUFFIC is the Netherlands Organization for International Cooperation in Higher Education. Their mission is to link Knowledge Worldwide. For more information see, http://www.nuffic.nl/ (Last accessed October 2, 2007)

the Kenya one, they all had IK in them some place" (Audrey Maretzki, personal communication, August 8, 2007). She adds that for herself:

IK is simply an abbreviation for indigenous knowledge and I seldom ever use the term IK, I would tend to use indigenous knowledge and use the whole thing or local knowledge or whatever, and I only use IK in writing you know…IK is just a way of reducing the number of words… [or] trying to shorten where I'm using it as an abbreviation for indigenous knowledge (Audrey Maretzki, personal communication, August 8, 2007).

F. Processes involved in institutionalization

In this section I detail how indigenous knowledge is validated through ICIK. Validation is a key process in the institutionalization of indigenous knowledge at Penn State.

1. Validation

Both Maretzki and Semali believe that validation of indigenous knowledge can only be done by the local community members. As they indicate in their definition of indigenous knowledge, they say that indigenous knowledge is validated by local community members because it has been used for generations and "reflect[s] thousands of years of experimentation and innovation."[211]

Semali states that Western science cannot solely be used to validate indigenous knowledge. He says that Western science simply generalizes all knowledge to one and assumes that one scientific method applies to validate all forms of diverse knowledge. This he believes is the biggest mistake made by Western science. He says, "the problem, you see…[is that the Western scientists]…show [only] the differences [between indigenous and conventional knowledge] and it stays there…" (Ladi Semali, personal communication, August 8, 2007). Indigenous knowledge is generally seen as inferior to

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[211] See http://www.ed.psu.edu/icik/ (Last accessed on February 21, 2008)

Western or conventional knowledge. Therefore, Semali believes this will only change

when validation of indigenous knowledge is, "localized and holistic" (Ladi Semali,

personal communication, August 8, 2007).

He advocates for local communities to use their indigenous validation techniques

to validate their knowledge, even if these validation techniques are as simple as a

community's continuous use of this knowledge for generations. He says:

the ways to validate indigenous knowledge is not the way we define validation in the
Western science. [Indigenous knowledge exists in] different context[s], so we have to
use different measures, indigenous measures, to validate indigenous knowledge (Ladi
Semali, personal communication, August 8, 2007).

Semali says "the historical, the cultural, the transformational…" (Ladi Semali,

personal communication, August 8, 2007) all of these aspects need to be taken into

consideration. He gives an example:

you know this guy, he went to Egypt you know, and when they were excavating and
found the mummy there, and made a discovery, I mean, I'm using science to validate a
work and then I wonder whether the people who were preserving the mummy for all
these years, did they know which way to do it, in the right way so that it is successful?
So you can come in a million years and find it? What about those ways? Those are
forgotten (Ladi Semali, personal communication, August 8, 2007).

Semali, however, could not elaborate on indigenous validation techniques as he

himself does not know its specifics. He tells me to learn more about indigenous

validation techniques:

you should ask the local [i.e.] medicine people. Because I don't know how their minds
work in terms of identifying medicinal properties. And even to isolate the toxicity of
those medicinal plants, more how they identify the catalyst that breaks down the
properties of this one particular medicinal property, so that it does not have side effects,
or deleterious effects on your body (Ladi Semali, personal communication, August 8,
2007).

Maretzki has a slightly different respond in regards to validation. She says, "I haven't been nearly as worried about that issue" (Audrey Maretzki, personal communication, August 8, 2007). Although, she also believes that validation should be localized and context-specific. For example she says:

validation strategies and techniques developed for local knowledge around let's say crop dealing with water shortages [are different] then it is [for]…indigenous knowledge dealing with health issues " (Audrey Maretzki, personal communication, August 8, 2007).

She believes that participatory research is important in this area as it is a tool faculty or other researchers can use, "in their discipline in contact with the community with their concerns and you raise some of those validation issues out of the concept of participatory research" (Audrey Maretzki, personal communication, August 8, 2007). The local community, she believes, have their own validation techniques and can be brought out in participatory research.

The directors of ICIK, therefore, support the validation of indigenous knowledge as it is used in its local environment local context, or its content specific use (i.e. agriculture, healthcare, education, etc.). In addition, Semali and Maretzki suggest that only local community members can validate their own knowledge. For researchers studying indigenous knowledge from outside the community perspective, they recommend the use of participatory research as they believe this methodology allows community members to indicate what their indigenous knowledge is, what they use the knowledge for, and how they validate it in their local community context.

G. Opportunities

The directors of ICIK have created many opportunities for indigenous knowledge at Penn through their monthly seminars, conferences, and publications. All of these activities have given opportunities for indigenous knowledge to be institutionalized as research or as part of scholarly discussions. Maretzki says that the working groups, which started recently, are going to be valuable in further institutionalizing indigenous knowledge at Penn State because indigenous knowledge is directly incorporated into on-going faculty research. In addition, Penn State faculty are collaborating with faculty/researchers in developing countries to enhance the exchange of indigenous knowledge. Maretzki says, "this working group…give [faculty] an opportunity to link their discipline" (Audrey Maretzki, personal communication, August 8, 2007) to indigenous knowledge. She adds that ICIK gives faculty an opportunity to research indigenous knowledge which many departments believe is not in the core discipline, but "on the fringe" " (Audrey Maretzki, personal communication, August 8, 2007). ICIK's working group also provides opportunities for research and scholarship for indigenous knowledge at Penn State.

Morias confirms the support ICIK provides faculty at Penn State. He says:

I'm really excited about now, is we have a working group. And there's people from the medical college, from the law, from agriculture, from nutrition, from tourism, from economics, from sociology, and we're all collaborating with each other, writing grants to go to the research and development work (Duarte Morias, personal communication, October 14, 2007).

He adds that ICIK seminars and conferences are helpful, but credits Ladi and Maretzki for being, "able to harness many of them to these working group meetings" (Duarte Morias, personal communication, October 14, 2007). In addition, he says the

working group acts as an independent interdisciplinary research group and has created a research framework in which faculty can apply for grants or do research on indigenous knowledge without conforming to the needs of their academic departments. This means the working group can focus on indigenous knowledge being the center focus of the research as opposed to simply "icing on the cake" in another project in their respective disciplines. Therefore, the working group, he says, allows faculty to, "succeed professionally…with still maintaining that appreciation [in the work they are doing with indigenous knowledge]," (Duarte Morias, personal communication, October 14, 2007).

Since 1995, the directors of ICIK have hosted conferences on indigenous knowledge, continue to conduct monthly seminars, and recently started a working group with 40 individuals from Penn State. Currently, Maretzki says that, "about 1500 people" (Audrey Maretzki, personal communication, August 8, 2007) are on the listserv and as part of the consortium. Monthly seminars yield approximately, "15-20 people depending on the topic [and their 2004 conference had 100 attendees from] 17 countries represented, 18 US States…" (Audrey Maretzki, personal communication, August 8, 2007). ICIK also raised $80, 000 for the 2004 conference to help support attendees from developing countries to attend the conference.

ICIK hopes the working group will encourage, "medical students from the College of Medicine…to undertake voluntary service and applied research projects…in East Africa," and hope that undergraduates will choose countries in East Africa for their study aboard experience (ICIK website). Lastly, they anticipate faculty participating in

the working group to integrate their experience working with indigenous knowledge into their courses.[212]

H. Challenges

Although many opportunities have been created for indigenous knowledge at Penn State, through ICIK, there are four major challenges indigenous knowledge faces in the academy. These challenges include indigenous knowledge being on the fringe in academic disciplines, difficulties in forming research collaborations, in nomenclature – using the term 'indigenous' to describe these forms of knowledge, and funding available for research.

1. Indigenous knowledge on the fringe

Maretzki says that indigenous knowledge is always, "on the fringe" in academia and describes generating faculty interest in indigenous knowledge as, "sort like pulling teeth" (Audrey Maretzki, personal communication, August 8, 2007). She blames academia's established academic disciplines for this. She says:

you know we put all of our knowledge into silos. [And] disciplines have been defined in academia as being associated with certain bodies of knowledge and techniques. And, those are not necessarily the bodies of knowledge or the techniques that are useful when you are trying to think about indigenous knowledge (Audrey Maretzki, personal communication, August 8, 2007).

She adds, "I don't think indigenous knowledge could, would think of itself as a discipline" (Audrey Maretzki, personal communication, August 8, 2007).

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[212] See http://www.ed.psu.edu/icik/ (Last accessed on February 21, 2008)

She says it is scary for a faculty member to venture over to indigenous knowledge:

we say that, for an academic to work at the, be interested in indigenous knowledge is to be at the fringe of your discipline. And fringe is not a comfortable place for a new academic because they have to get their tenure…in the middle of their discipline, by that time they've established themselves in that. That's where they've gotten their experience and funding, etc. And so, it's very difficult to migrate from the middle of your discipline to the ex-outside because that's a scary place…to be a fringe academician is a scary and risky place to be (Audrey Maretzki, personal communication, August 8, 2007).

She questions, do faculty call themselves an, "indigenous knowledgeist?" (Audrey Maretzki, personal communication, August 8, 2007). She says they rather identify themselves by the established academic disciplines. For example, she says, "we [Semali and her] get paid for being an academic disciplinarian, Ladi in curriculum and development and me in food science and nutrition" (Audrey Maretzki, personal communication, August 8, 2007). Therefore, indigenous knowledge is something which is seen as cross-cutting through disciplines and investing research solely in indigenous knowledge can be harmful to an academic career.

2. Difficulties in forming collaborations

The "working in silos" Maretzki describes makes it difficult for ICIK to collaborate with other programs at Penn State. Although their working group has addressed this, and is planning collaborative projects with local communities on indigenous knowledge, Semali reminds me that the working group is only comprised of individual faculty interested in indigenous knowledge. They represent various departments at Penn State, but have joined the working group because of their personal interest in indigenous knowledge. Therefore, Semali says collaborative work with entire

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departments is very difficult, "because of the way academia is structured" (Ladi Semali, personal communication, August 8, 2007).

Semali acknowledges that he does, "find people who are interested, but it comes to the bottom line which is what do I get out of the this? I mean how many articles, how many grants?" (Ladi Semali, personal communication, August 8, 2007). In addition, he says that many faculty members claim that they do not know anything about indigenous knowledge. It is not a, "copout," (Ladi Semali, personal communication, August 8, 2007) he says, but more that "white Americans" (Ladi Semali, personal communication, August 8, 2007) feel that they are not experts in this area. He says that faculty do not understand that ICIK's mission is simply to bring different worldviews or place-based knowledge to the academy, and "White Americans" have this to offer as well.

3. Nomenclature – the trouble with "indigenous"

After a few years of using the term indigenous at ICIK, Semali says people at Penn State began to question why that term was used to describe the knowledge ICIK works with. He says similar to what happened at the World Bank and their difficulty with the term indigenous, ICIK also has had to reword their project titles and descriptions. For example, he says one of their recent projects is, "called the initiative to alleviate poverty…" (Ladi Semali, personal communication, August 8, 2007). This project does not mention "indigenous." Semali, however, says that he does emphasize that the, "initiatives…are sensitive to indigenous ways of knowing, of thinking, indigenous ways of doing" (Ladi Semali, personal communication, August 8, 2007).

Morias adds that indigenous is seen as a, "derogatory term socially and perhaps also in academia…[and] in several parts of Africa" (Durate Morias, personal communication, October 14, 2007). He notes that local, traditional, or authentic may be better terms, although these terms, "are [also] taboo words in different camps" (Durate Morias, personal communication, October 14, 2007).

The use of the term indigenous is probably problematic for ICIK as many Penn State faculty and others associate the term with solely indigenous people or do not see the relevance of indigenous in their work. The latter seems to be the greater problem as many faculty in established academic disciplines are not comfortable researching indigenous knowledge because they feel they are not qualified on the topic.

For example, a faculty member in chemistry or classical literature may mainly be educated on Western science and scholarly work, hence, may feel they do not know enough to incorporate indigenous knowledge into their teaching and research. Semali says he finds this feeling mostly among "White Americans." They too, however, have indigenous knowledge (according to the way ICIK defines it). Semali believes indigenous may not be the appropriate term to describe these forms of knowledge and suggests the term "place based knowledge systems" (Ladi Semali, personal communication, August 8, 2007) as this term better describes the various knoweldges that come together at the academy and contribute towards the established academic disciplines.

Semali and Maretzki are thinking of a new name for ICIK and another term for indigenous knowledge. Semali (2007) says that the challenges they have seen at Penn State and the World Bank situation has heavily influenced them in their decision to

change the name, "I mean after seeing what happened at the World Bank, it is very disconcerting. They were our hope"[213] (Ladi Semali, personal communication, August 8, 2007).[214]

4. Funding limitations

Funding for indigenous knowledge research through ICIK is limited not only because the research or projects use the term indigenous, but also because of the content or approach of a project. For example, Semali says that Maretzki and he look for grants, "everywhere. Foundations have been generous to [them]. But, we just have to reinvent ourselves to strap ourselves with the attitudes that we don't use indigenous…" (Ladi Semali, personal communication, August 8, 2007). Maretzki, however, says, "there's not that much money out there that you can compete for [because grant providers generally think that indigenous knowledge is simply] a tool [used alongside projects]" (Audrey Maretzki, personal communication, August 8, 2007).

Semali says ICIK lost out on many projects because of funding issues. For example, he says:

the project over at Woodlands, that they would like to collaborate with us, Greg Hassel, at the conference too, he is also a nutritionist like Audrey, and he works with Native Americans, and he would like to collaborate with projects, but we haven't been able to forge one project to work together. Because again, funding. If you get the grant you have a collaboration, if you don't get the grant then…you know, that's how the academy works (Ladi Semali, personal communication, August 8, 2007).

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[213] The World Bank was financially supporting programs/projects coordinated through ICIK
[214] Since the World Bank is a leading organization in international development, Semali felt that them having a program labelled as "indigenous knowledge" would be well advertised and respected in the development community. However, since the termination of the World Bank's program, Semali fears something similar may happen at Penn State. Hence, he is keen on changing the name of the institute so that scholars and practitioners in development do not dismiss the work at Penn State as they did at the World Bank.

Maretzki says that institutional base support, from Penn State, is also very limited for ICIK. Penn State supports larger initiatives or more mainstream research. For example, she says research on mad cow disease, through the College of Nutrition Sciences, receives more funding because Penn State believes it is necessary to invest more on this topic. Therefore, the research, grant writing, and administrative work fall upon Maretzki and Semali. ICIK did have a graduate student for a semester, to help with some administrative work, but Maretzki says that generally receiving support these areas, "is next to impossible [from Penn State]" (Audrey Maretzki, personal communication, August 8, 2007).

I. Future directions

When I asked Semali what he had planned for the future of ICIK, he threw me off at first by saying, "I cannot tell you…we are very protective of our property rights. Our intellectual property" (Ladi Semali, personal communication, August 8, 2007). He then laughed and told me he would tell me the general direction ICIK is going, but not provide too many details.

He plans for ICIK to become an institute at Penn State:

meaning…something to do with the university administration where you are accountable to your Dean and department head. You can have your own budget. When you apply for funds, you can take a certain percentage for your institute. It's really money (Ladi Semali, personal communication, August 8, 2007).

In addition, Semali and Maretzki would not always have to "report back to their own colleges" (Ladi Semali, personal communication, August 8, 2007). This means

ICIK would have more autonomy in using its own funds and conducting more research on indigenous knowledge.

Semali also indicated that Maretzki and he are trying to change ICIK's name, however, "don't have one name…" (Ladi Semali, personal communication, August 8, 2007). At the moment though, Semali is focusing on not using indigenous in project names. He says, "we don't name the project indigenous…it's about the concept. Until now I know, again our project in East Africa we are not calling it indigenous knowledge" (Ladi Semali, personal communication, August 8, 2007).

Maretzki has a different focus for the future direction of ICIK. She would like the working group to expand, more work to be done on the website, and members of ICIK to publish more peer reviewed journal articles. She says:

I would like to see a number of proposals submitted by and funded by this working group. So I think we're going to put a fair amount of time into that working group. The website is not as good as we'd like it to be…And clearly we'd need to continue to get peer reviewed articles out there (Audrey Maretzki, personal communication, August 8, 2007).

In addition, Maretzki says that, "Ladi and I are both hoping we can at some point get a Fulbright, that would be interested [in working with ICIK], Penn State gets a lot of Fulbright scholars…" (Audrey Maretzki, personal communication, August 8, 2007). She would also like to resubmit some rejected project proposals to foundations. For example, she says:

we did submit a proposal jointly with University of Alaska Fairbanks, and the University of Minnesota, [with] this colleague of mine there… [so] a graduate student…could have a minor or certificate actually [in indigenous knowledge]. And that proposal was well regarded by US Department of Agriculture, but didn't get funded, they only funded a few proposals that year, and we had fully intended to go in for with a revision the second year based on the comments…" (Audrey Maretzki, personal communication, August 8, 2007).

Both Semali and Maretzki have much invested in ICIK and hope a strong future for the consortium. Based on my discussions with them, I notice that they are aware of their challenges and plan address them for the future of ICIK.

J. Conclusion

The main activities operating through ICIK focus on raising awareness of indigenous knowledge and encouraging academic disciplines and research to integrate this knowledge. Their aim is to show that indigenous knowledge is significant and equally important to conventional or Western-based knowledge. ICIK, however, has encountered a number of challenges in achieving its mission. For instance, Penn State faculty have questioned why 'indigenous' is used to label these knowledge forms. In addition, many faculty are hesitant to incorporate this knowledge in their research as they feel they are not knowledgeable about the topic or believe it cannot compete with core academic disciplines. The consortium also faces issues surrounding the validation of indigenous knowledge and has limited financial support (and human resources).

Although challenges exist for ICIK, Semali and Maretzki are very committed to ICIK and plan to make ICIK an institute one day. They are currently addressing their challenges by thinking of a new way to label indigenous knowledge and are re-submitting rejected proposals without using the term indigenous. Semali and Maretzki are also optimistic that significant research will emerge from the working groups and will in turn lead to peer reviewed journal articles. This in turn may allow indigenous knowledge to be a part of core academic research. Based on my discussions with Semali and Maretzki,

I predict that ICIK's future is strong as they are working hard to address their challenges and working hard to sustain their consortium.

VII. Discussion

A. Introduction

In this study, I conducted a multi-case analysis of three programs: Division of Natural Products (at the National Institutes of Health), The Indigenous Knowledge for Development Program (at the World Bank), and the Interinstitutional Consortium for Indigenous Knowledge, ICIK, (at Pennsylvania State University). All three cases are located in the United States and operate globally (meaning their work is international), and studying these cases helped me answer my research question: how is indigenous knowledge represented in globally operating institutions in the Western hemisphere in the fields of education, health sciences research, and development?

In my proposal, I indicated that I would answer my main research question by asking the below sub-questions[215] in each of the case studies. The sub-questions investigate the nomenclature and definition and institutionalization[216] processes for indigenous knowledge in globally operating institutions. In regards to what is recognized as indigenous knowledge, I looked at how indigenous knowledge is defined in the institutions and what nomenclature is used to label indigenous knowledge. By examining the processes involved in the institutionalization of indigenous knowledge, I was able to understand how indigenous knowledge was gathered, validated, and embedded into an organization's structure and activities. In addition, these sub-questions unveiled the opportunities and challenges present for indigenous knowledge in their respective institutions. Based on the data collected, I was able to address all the sub-questions and

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[215] Questions developed from literature reviews and my personal work experience
[216] Processes involved in the identification, validation, and embedding of indigenous knowledge in an institution

develop findings on how indigenous knowledge is represented in three globally operating institutions. These findings are discussed below.

B. What is recognized as indigenous knowledge?

In the literature review, I indicated that the difficulty in defining the term indigenous may stem back to the disciplines from which the term originated. For instance, twenty years ago, indigenous was associated with physical science disciplines, such as botany, to classify plants and organisms. The term evolved and currently is equated to human identity (Niezen, 2003) and knowledge oppressed during periods of colonization or modernization (Semali and Kincheole, 1999; and Dei, Hall, and Rosenberg, 2000). In addition, over the last decade, the term has been popularized by its use in a number of international organizations.

The current use of the term, however, is complex because the term addresses a plurality of knowledge and worldviews held by various cultures and ethnicities. In addition, in practice indigenous knowledge is still commonly associated with knowledge held by indigenous peoples or communities.[217] Therefore, the term indigenous and who the indigenous are is heavily debated in literature and practice (Dean and Levi, 2003; Niezen, 2003; and Hughes, 2003) and one standard definition for indigenous knowledge may not be appropriate to capture the diversity of knowledge it actually represents. Hence, in each of the case studies, I investigated the current use of this term. Below I

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[217] This is suggested by Srikantaiah and Rueger (2008) who note this was the common understanding by staff at the World Bank. Some scholars also argue that the notion of indigenous peoples or communities should be challenged because there are many communities around the world who have characteristics of indigenous peoples or communities, but are not labeled as indigenous or recognized for indigenous rights (Nathani-Wane, 2000; Niezen, 2003; Semali and Kincheloe, 1999; and Dei, Hall, and Rosenberg, 2000). This idea is strongly reflected in two of the case studies, the World Bank's Indigenous Knowledge Program and Penn State's ICIK. The NIH also acknowledges knowledge outside communities labeled as indigenous, however, did not explicitly say this in their definition.

describe what knowledge is identified as indigenous and who are considered to hold this knowledge.

1. Definition set for indigenous knowledge

ICIK and the Indigenous Knowledge Program display very similar definitions for the term indigenous knowledge. For instance, ICIK formally defines indigenous knowledge as, "ways of knowing, seeing, and thinking that are passed down orally from generation to generation and which reflect thousands of years of experimentation and innovation in everything from agriculture, animal husbandry and child rearing practices to education; and from medicine to natural resource management."[218] [219] This definition closely follows scholars who believe that indigenous knowledge exists outside of indigenous peoples and is knowledge that may be documented or orally passed from generation to generation by elders in a community (Owaga, 1995; Semali and Kincheole, 1999; and Dei, Hall, and Rosenberg, 2000). The definition is not specific to any one community, culture, or society, and hence, suggests that indigenous knowledge could exist anywhere in the world.

ICIK's definition also acknowledges differences in worldviews. As Semali (2007) noted in chapter VI, on the Penn State case study, acknowledging the background or worldviews an academic brings with them to the academy provides greater

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[218] See http://www.ed.psu.edu/icik/ (Last accessed on February 21, 2008)

[219] As mentioned in chapter 6, on the Penn State case study, personally Semali believes that indigenous knowledge cannot be defined and therefore, for ICIK he prefers "describing" the knowledge, which can be considered indigenous, such as "names, artifacts, and the objects" (Ladi Semali, personal communication, August 9, 2007). Maretzki says that Semali and she only formally decided to define indigenous knowledge a few years ago for a number of reasons, including reviewers from journals asking them what body of knowledge they are addressing and distinguishing themselves from, "knowledge that was generated by the first peoples who inhabited an area" (Audrey Maretzki, personal communication, August 9, 2007).

opportunities for non-Western, or knowledge outside conventional paradigms or disciplines, to be a part of academic dialogues. He adds that even White Americans have their worldviews, as he refers to it, or indigenous knowledge, to share in the academy.[220]

The Indigenous Knowledge Program broadly defined indigenous knowledge as, "unique to a particular culture and society; it is the basis for decision-making in agriculture, health, natural resource management, and others. It is embedded in community practices, institutions, relationships, and rituals. It is also considered as tacit knowledge" (Local pathways to global development, 2004). The program's definition of indigenous knowledge complements ICIK's definition in that they do not limit their definition to indigenous peoples and emphasize the dynamic and multifaceted nature of indigenous knowledge. The program also discusses knowledge embedded in community practices which align with scholars who write that indigenous knowledge reflects cultural perspectives, beliefs, such as superstitions, and experiences of social and natural environments pertaining to a community or culture (Snively and Corsiglia, 2001 and Kawagley, et. al, 1998).

The Indigenous Knowledge Program's work also focused on working with communities in developing countries who are labeled "poor" by the World Bank. The World Bank defines the poor as people in the world making less than one U.S. dollar a

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[220] For example, Semali's colleague and co-editor of the book *What is Indigenous Knowledge?*, Joe Kincheloe, writes that as a White American he has indigenous knowledge which he brings to the academy. He grew up in a rural area of Tennessee in the Southern Appalachians where his parents and he were shielded from "modernization" in their mountain culture. Similar to Semali's experience growing up in rural Tanzania, Kincheloe writes that he too felt disconnected between home and school life and that he and many of his classmates did not see the relevance of their primary and secondary education to their home contexts. Kincheloe brings these experiences to the academy as they represent his worldviews or indigenous knowledge.

day and categorizes countries based on annual GNI[221] per capita. Therefore, a less developed country, or developing country, falls in their category of low income to lower middle income countries. These countries have a GNI of $905 - $3, 595 per year.[222]

Informants from both ICIK and The Indigenous Knowledge Program also emphasize the locality of knowledge to a geographic area. For example, as presented in chapter VI, on the Penn State case study, at ICIK Morias says that indigenous knowledge is context-specific and that in his field of tourism this knowledge, "is anchored on the local culture, local affairs, local foods, local landscapes, and how people interact with those landscapes" (Duarte Morias, personal communication, October 5, 2007). Watkins and Pidatala, from the Indigenous Knowledge Program, also note that indigenous knowledge can be considered as local knowledge of a community or in a country.

The NIH differs in their definition of indigenous knowledge and suggests that indigenous knowledge is invalidated knowledge existing outside of conventional knowledge. For instance, in the Natural Products Branch, Cragg says their work with natural products are defined as, "the actual chemical…a natural product but it's a single chemical entity" (Gordon Cragg, personal communication, May, 23, 2007). Therefore, even if a natural product or alternative medicine exists, Cragg says the program is interested in the specific chemical responsible for the alternative medicine or natural product's mechanism of action. For example, he says the popular drug Taxol, used for cancer treatment, is one single chemical isolated from the Pacific Yew tree. Although the entire Pacific Yew tree is used as medicine by local communities in the north-west

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[221] The World Bank's website indicates that they prefer to classify countries based on gross national income (GNI) rather than gross national product (GNP).
[222] See www.worldbank.org (Last accessed February 21, 2008)

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coastal Pacific region of the US, researchers at the NIH are only interested in the one chemical entity supposedly responsible for the plant's medicinal nature.

Researchers at the NIH also follow the principle that the Western scientific method can study a biomedical model in isolation from its environment, or other externalities, and can be tested against one reality or "universal truth" (Ogawa 1995 and Snively and Corsiglia 2000). Therefore, the alternative medicine's home environment, which may reflect different worldviews, is not taken into consideration. The isolated chemical's mechanism of action is the only reaction or explanation why an alternative medicine may work. In addition, since researchers at the NIH are educated in the same scientific paradigm and have common knowledge and aptitudes in Western or conventional science (Nader 1996) everyone at the NIH is probably in agreement with the Western scientific method and aims to use this knowledge in their research.

Although all three case studies' definitions reflect that indigenous knowledge originates from local community practices or outside conventional knowledge, the Indigenous Knowledge Program and ICIK seem to be more open as to what can be classified as indigenous knowledge. In addition, each case study's definition of indigenous knowledge reflect their respective institution's mission and goals. For instance, the Indigenous Knowledge Program focused on marginalized, poor, or rural knowledge in developing countries, ICIK's focus lies in addressing the plurality of knowledge or worldviews[223] in our world and how this should be addressed in the academy, and the NIH seeks to validate medical knowledge outside conventional medicine. The NIH, however, is very particular and technical in their definition

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[223] ICIK's latest project, their working group, however, focuses on addressing the MDGs in East Africa.

suggesting that they cannot accept indigenous knowledge unless it is validated to their standards. This will be detailed more in the next section.

2. Aligning to the set definitions

Despite each case study setting up a definition for indigenous knowledge, I found that some program definitions do not align with the knowledge collected under the label of indigenous. For instance, this is evident in the Indigenous Knowledge Program. Therefore, in this section I discuss the issue and each case study's rationale behind selecting a knowledge system as indigenous.

Researchers at the NIH are very specific with the knowledge they recognize in their Natural Products and Alternative Medicine programs. For instance, White indicates that there is a difference between "folk medicine" and "structured medicine" within the alternative medicine framework. Folk medicine, he notes, is unscientific home remedies or knowledge passed down from grandparents or other elders in the family. The NIH is not interested in these systems of knowledge. Structured medicines on the other hand, which are well documented in their respective societies, are of interest to researchers and can be validated by the Western scientific method. According to White structured medical systems include systems like Ayurveda and Traditional Chinese Medicine.

Informants from the Indigenous Knowledge Program and ICIK claim they are not as specific or systematic in their identification of indigenous knowledge. Prakash says that the Indigenous Knowledge Program's identification and collection of indigenous knowledge was mainly done through field work in countries of East Africa, India, and Sri Lanka where he met with local communities and observed their indigenous practices. He

notes that these practices may not be validated to the standard set by the NIH or WHO. Prakash did, however, have the authority in deciding what the program would institutionalize as indigenous knowledge. For example, if he felt that a certain knowledge system was credible, he identified it as indigenous knowledge, documented it, and brought it back to the World Bank.

ICIK's directors and faculty follow a similar methodology to the World Bank in their fieldwork, however, do not come in between what the community believes is their indigenous knowledge and what is taken back to Penn State. ICIK's directors and faculty prefer local communities to identify and communicate their own indigenous knowledge to members outside their community. They note that their role (from ICIK) is to help local communities identify their indigenous knowledge using participatory research methods.

In actuality, however, the Indigenous Knowledge Program aligns more with the NIH, as they did prefer to work with well documented indigenous knowledge or those well recognized in the region or country. For example, Prakash says that with his work in Kerala he worked with the chief minister's office to integrate knowledge and practices of Ayurveda into the state's 10th five-year plan. The program decided to advocate for Ayurveda because, as Prakash notes in chapter V, on the World Bank case study, that this indigenous medical systems is, "very well documented, very well practiced" (Siddhartha Prakash, personal communication, July 21, 2007). Written documentation (as opposed to oral traditions) and the standardization of knowledge is also considered universally applicable by Western development practitioners or in the conventional knowledge paradigm (Shiva, 2000 and Agrawal, 2002).

In addition, as mentioned earlier, the Indigenous Knowledge Program staff had the authority to decide whether an indigenous knowledge or practice was beneficial in the development process. For example, on their website the program stated that not all forms of indigenous knowledge are appropriate for development or to solve a community's problem. They refer to these as "harmful indigenous knowledge practices" (Indigenous Knowledge for Results, 2007b) and identify slash and burn agriculture and female circumcision as harmful. Unfortunately, in doing this, the program is questioning the genuine nature of indigenous knowledge as the practitioners or researcher's bias is reflected in the identification of knowledge.

Agrawal (2002) and Stromquist and Samoff (2000) all write that practitioners from Western institutions, or in the North, manipulate the information they institutionalize in their programs or projects – including indigenous knowledge. Klees (2002) comments that this simply creates an "Opinion Bank" where the World Bank practitioners are gathering, labeling best practices, and disseminating knowledge they believe is appropriate for development. Therefore, the staff in the Indigenous Knowledge Program are basically monopolizing the knowledge they gather and label as indigenous knowledge.

Although ICIK and the Indigenous Knowledge Program work closely on addressing the MDGs in East Africa, ICIK's directors are more open regarding what can be classified as indigenous. Semali mentions that even art pieces or images are given consideration as representing indigenous knowledge. The reason for ICIK's greater consideration on what is classified as indigenous knowledge probably stems from the academic environment it is housed in. The consortium's directors and faculty have more

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autonomy and do not need to report to a central institutional mission or set of objectives. Staff at the World Bank and the NIH, on the other hand, have less autonomy as they need to align their program's work to their overall institution's mission and goals.

ICIK is also the only case study to recognize the issue of differences in power at the local level. Semali and Maretzki note that the plurality of knowledge representing indigenous knowledge is an important issue as it can create hierarchies of knowledge within indigenous knowledge. Therefore, they use the term "knowledges" as they believe this opens discussions to the hierarchies, diversity, and plurality of knowledge. In addition, they believe it attempts to make their identification of indigenous knowledge more true to the context it exists in.

The majority of literature and practice fail to acknowledge hierarchies of indigenous social structures. For example, gender, age, and other ethnicities are important to note within communities as they dictate who holds or has greater power of certain aspects of their indigenous knowledge. In addition, certain forms of indigenous knowledge, although also having been oppressed by colonization or modernization, are dominant and may undermine lower class members of society.

For example, as discussed in the literature review, the medical system Ayurveda is heavily discussed by Shroff (2002) and Mahindalpala (2003) as indigenous knowledge because the British in the subcontinent of India oppressed it during their colonization. Although this medical system can help all members of a society, the founders of Ayurveda are from the Brahmin class in the Hindu religion (Neddermeyer, 2006) and Ayurvedic doctors are generally Brahmin. Therefore, the upper caste members remain in

control over this knowledge and decide to whom it can be disseminated. Lower castes simply remain receivers of the medicine.

Therefore, Semali and Maretzki's work in this area is important as power differences can explain why certain forms indigenous knowledge are acknowledged by the West or those outside indigenous knowledge community holders. For example, the work in this area may explain why the NIH and the Indigenous Knowledge Program prefer to work with structured knowledge over folklore. In addition, it further explores the critiques raised by Agrawal (2002), Klees (2002), and Stromquist and Samoff (2000), because structured forms of indigenous knowledge, like conventional knowledge, represent the "dominant class, gender, and racial backgrounds" (Rosenberg, 2000 pg. 143). Also, understanding hierarchical social structures facilitates understanding who in a local community becomes involved in international projects and who benefits from them. For example, gender relations can explain hierarchies women face in their community and can reflect gender biases in what indigenous knowledge is represented at the global level.

The discussion of hierarchies in indigenous knowledge is also important in the nomenclature or terminology used. The labels used for this knowledge can reflect their diversity, marginalization from conventional knowledge, and their evolving characteristics. The nomenclature or terminology used by each case study is discussed below.

3. Nomenclature

a. Local, traditional, and indigenous

The plurality of terms used to describe knowledge outside of conventional knowledge can lead to a misunderstanding of the terms indigenous, traditional, and local knowledge and the context these terms are used (Srikantaiah and Rueger, 2008). Since theoretically these terms can be quite distinct, in practice the plurality of terms used to describe indigenous may result in misconceptions on what knowledge is being referred to in global policies or programs. Therefore, in each of the case studies it is important to investigate what nomenclature they use and to which communities the knowledge belongs. This will help other institutions or researchers, working on similar causes, better understand the work being done in these programs.

All three of the case studies use multiple terminology to describe indigenous knowledge. Both the Indigenous Knowledge Program and ICIK use the term indigenous and they also interchangeably use the terms local and traditional with indigenous – referencing all terms to have the same definition.

In the Indigenous Knowledge Program, Prakash notes that there was no difference in meaning based on terminology. Pidatala adds that it is only because World Bank staff misunderstood what the program meant by indigenous that other terms such as local and traditional were used.

Similarly, at Penn State, Maretzki says that the terms were interchangeably used because many faculty and other researchers at Penn State did not associate "indigenous"

with their research or work. Therefore, Maretzki says using "local" and "traditional" helped ICIK reach out to a wider audience.[224]

The NIH does not use the term "indigenous" to describe medical systems outside of conventional systems, but as discussed in chapter IV, on the NIH case study, they use the terms "traditional," "natural products," and "alternative" interchangeably.

As discussed in the literature review all these terms can have different meanings. For instance, local knowledge is all knowledge that is locally situated (Antweiller 1998) and can exist in a nation state, a society, a university or a meeting (Evers 2003). In addition, local knowledge generally includes knowledge of all local communities, or communities of practice, in a geographic area and does not differentiate between imported and locally generated or based knowledge. This can include knowledge generated around a locally developed McDonalds; therefore, the struggle of oppressed groups/peoples and their knowledge may be overlooked.

Traditional knowledge, another term interchangeably used with indigenous, is defined as knowledge with a historic past which reflect the continuous use of practices or customs based on their culture that are vital and central to a community (Otto and Pedersen 2005). This definition is similar to definitions used by the case studies.

The main difference between the terms traditional and indigenous lies in the fact that indigenous has in the past been mainly associated with indigenous peoples and the issues they are fighting for in human rights, land rights, and rights to exercise or to preserve their own knowledge. Over the last two decades indigenous knowledge has

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[224] The only reason why ICIK mainly uses the term indigenous is because the consortium began, "at a time when the center on indigenous knowledge at Iowa State was at its peak" (Audrey Maretzki, personal communication, August 8, 2007). Iowa's center and others around the world were using indigenous knowledge in their titles at that time, so ICIK joined their bandwagon.

become associated with marginalized communities not labeled as indigenous, but who face similar challenges as indigenous peoples. Therefore, some scholars prefer to describe all marginalized knowledge or knowledge that is held by all disadvantaged communities as indigenous knowledge (Semali and Kincheole 1999 and Dei, Hall, and Rosenberg 2000) because they feel it brings the same political attention that is brought to indigenous peoples.

Traditional knowledge on the other hand is limiting, and in some cases may not be able to promote the beneficial aspects of the knowledge. For example, although some development scholars have challenged the development theory of modernization and consider it as obsolete in major development organizations (Lachenmann 1994 and Faschingeder 2001), current practices in development still follow the basic principles of the modernization theory, which include exchanging "traditional" values for "modern" values (So 1999 pg. 36).[225] Therefore, traditional knowledge can be seen as an obstacle to development or modernization.

This discussion is relevant to the Indigenous Knowledge Program and ICIK's working group, as both case studies are working to highlight the importance of indigenous knowledge in the field of development. The term indigenous knowledge was probably used by Indigenous Knowledge Program to avoid the challenges associated with the term traditional. In addition, perhaps the Indigenous Knowledge Program manager thought that indigenous could bring more political attention to the knowledge in their work programs.

The Indigenous Knowledge Program and ICIK, however, ran into problems using the term indigenous. For example, as mentioned earlier, Maretzki says she was

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[225] See also Fagerlind and Saha (1989) for discussions on development and the modernization theory.

concerned that others at Penn State would not associate indigenous in their work. In addition, Watkins from the Indigenous Knowledge Program says people did not highly think of knowledge labeled as indigenous as they would interchange it with voodoo and witchcraft. [226]

Semali and Maretzki mention that the only reason they continued to use the term indigenous at ICIK is because of the late Michael Warren. As discussed in chapter VI, the Penn State case study, they invited Michael Warren to Penn State to help set up ICIK and unfortunately, shortly after his visit to Penn State, Michael Warren passed away. Therefore, in memory of Michael Warren, they kept using indigenous in the title of their center. Semali and Maretzki are, however, thinking of a new name for ICIK and another term for indigenous knowledge. Semali says that the challenges they have faced at Penn State and the World Bank situation has heavily influenced them in their decision to change the name.

Prakash, however, comments that it is a waste of time for the Indigenous Knowledge Program, and other programs, to address the challenge of inappropriate terminology. He criticizes other programs for solely spending their time on this challenge. He believes spending time on this issue takes away time from actual development work. Pidatala, on the other hand, does note that the term indigenous did not work at the World Bank and in order for development work to be more productive or effective in indigenous knowledge other alternatives in terminology need to be sought.

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[226] As discussed in the literature review, in a Washington Post article, Harrison (2006) who has over 20 years of experience in international development writes that a major obstacle to development is because of "culture." In his work in Haiti, he describes their religion as voodoo which "nurtures mistrust and irrationality" and suggests that this comes in the way of implementing effective health and education programs. Srikantaiah and Rueger (2008) suggest that the impression, such as Harrison's (2006), are also seen at the World Bank.

b. Indigenous peoples

Data from ICIK and the Indigenous Knowledge Program support the literature in that who the indigenous are is very political and generally left for individual governments to decide who represented as indigenous in their countries (Hughes, 2003 and Srikantaiah and Rueger, 2008). For example, as discussed in the literature review the government of Botswana decided not to participate in the UN-declared year of Indigenous Peoples (held in 1993) because the government claims that everyone in their country is indigenous (Lee 2003). Therefore, ICIK and the Indigenous Knowledge Program's work stayed away from political discussions associated with indigenous peoples and focused their work simply on knowledge. The NIH also avoided the discussion on indigenous peoples. If Indigenous Peoples were involved in the NIH's work, then they referred to the definitions created by the United Nations and other international organizations in recognizing or acknowledging indigenous peoples or groups.

The case studies, however, do suggest there is still great confusion on who the indigenous are and why indigenous knowledge should not be limited to groups labeled as indigenous peoples. Unfortunately, since there is no consistent definition of who the indigenous are, it continues to lead to ambiguity on who the indigenous are. In addition, it does not help any of the case studies to progress in their work for marginalized communities and their knowledge. Therefore, I believe a new framework needs to be created to recognize the indigenity of populations in countries or the terminology used by these programs needs to change so that all marginalized people and their knowledge is recognized at the global level.

c. The acronym "IK"

Indigenous knowledge was also referred to as "IK" in abbreviation in both literature and practice. In addition to this acronym being contested by some scholars, such Briggs and Sharp (2004), who write that using the acronym "IK" presents indigenous knowledge as un-dynamic and static, this acronym had also caused some controversy when I interned with the Indigenous Knowledge Program. For instance, as presented in chapter V, some World Bank staff teased the manager Nicolas Gorjestani that "IK" is a just an extension of Nic. When I asked my Penn State informants about the acronym 'IK,' Semali and Maretzki says it is only used as a matter of convenience.

d. Renaming indigenous knowledge

In reviewing the data, I believe that the term indigenous knowledge needs to be reconsidered. As mentioned earlier, although in theory, local knowledge is all knowledge that is locally situated (Antweiller, 1998) and traditional knowledge is used to reference both conventional and marginalized knowledge, using either of these terms eliminates the confusion surrounding indigenous knowledge belonging to indigenous peoples. The term local knowledge emphasizes the geographic locality of knowledge and the term traditional accentuates the connection the knowledge has with its local/surrounding environment or cultures.

Ideally, however, local knowledge may be preferred over traditional, as it eliminates the perception or misunderstanding that marginalized knowledge is inferior or backward to conventional knowledge. As Agrawal (2002) notes there is no need to differentiate between types of knowledge by calling them indigenous; instead all

knowledge should be referred to as one. He does note that the diversity under this umbrella term be addressed. For instance, some knowledge has historically suffered from colonization or modernization, and therefore, may not be considered on equal par to other forms of knowledge.

At the global level, especially in the Western hemisphere, addressing the diversity of knowledge is challenging as conventional knowledge are clearly dominant over other forms of knowledge. Therefore, I do acknowledge that at the global level a distinction between conventional and marginalized knowledge is important to highlight, as these forms of knowledge are not included in conventional medicine, education, or development paradigms.

The terms place-based knowledge, context-specific knowledge, locally adaptive knowledge/development[227], or endogenous, also discussed in literature, are other options. These terms, however, are not appropriate for the Indigenous Knowledge Program. One of the Indigenous Knowledge Program's main objectives is the exchange of indigenous knowledge between communities or across different countries or cultures. Therefore, the World Bank staff may question the applicability of context-specific knowledge or an endogenous knowledge system from one area to another. These terms may only be appropriate for ICIK as their program does not focus on the transfer or exchange of knowledge between communities.

Although the NIH's identification and validation of indigenous knowledge is not fair in acknowledging knowledge with different worldviews, their use of terminology maybe the most appropriate. Although, Cragg did note that there is much confusion regarding terminology, however, all three informants from the NIH case study did infer

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[227] Suggested by Watkins from the World Bank

that the terms they used did not receive any contestation from within their institution or in the medical community. Granted, the terms natural and alternative are obviously different from the term synthetically produced, but the NIH's use of the term complementary works well. For practitioners and researchers educated or working in the Western hemisphere, using the term complementary highlights that there exists medical knowledge outside the conventional medicinal system and that this knowledge, in theory, can be used complementary to conventional knowledge.

The term complementary can also work well at ICIK and the Indigenous Knowledge Program. As presented in the literature review, scholars in the field of indigenous knowledge are not trying to romanticize marginalized knowledge, but rather, they are attempting to highlight their absence in the conventional knowledge/thought paradigms. There are positive and negative aspects of both conventional and indigenous knowledge and the term complementary suggests that both forms of knowledge not only exist concurrently, but also that they can be used in a complementary fashion. The term complementary is also important in this research study because all the practitioners or academicians interviewed (and working in the case studies) are trained in the Western paradigm or conventional thought paradigm. Therefore, even unconsciously, they are bringing their Western frameworks to the local, traditional, or indigenous contexts. Ultimately the collaboration or project they are involved in or develop will combine the two knowledge paradigms. For instance, ICIK publishes their research in scholarly journals, the Indigenous Knowledge Program creates knowledge nuggets and institutionalizes local and community knowledge in databases, and the NIH validates all knowledge to the Western scientific paradigm. In each case study conventional

knowledge paradigms are used in juxtaposition with indigenous knowledge to promote the knowledge in their respective institutions.

4. Conclusion for section B

In conclusion, all three case studies broadly define indigenous knowledge and emphasize the locality and traditional nature of indigenous knowledge; however, they slightly differ in what indigenous knowledge they work with in their programs.

The NIH is the most consistent regarding their definition and the knowledge they work with. They clearly define that they only work with indigenous knowledge belonging to structured knowledge, which they validate, and use to their standards. They do not acknowledge folkoric or undocumented knowledge in their work program.

On paper, the Indigenous Knowledge Program presents itself as a maverick program in international development by claiming to integrate knowledge of the poor into conventional development practices at the World Bank; however, they differed from their definition to their identification of indigenous knowledge. The program's definition did not align in their identification of indigenous knowledge – mainly because they could not escape the World Bank's dominant development paradigm. Therefore, in reality they manipulated the indigenous knowledge they gathered and only presented case studies they thought would be well received or appropriate at the World Bank. Better measures need to be undertaken to identify indigenous knowledge at the World Bank so that it is appropriately represented. This will be further discussed in section B.

ICIK is more consistent from their definition to their identification of indigenous knowledge than the Indigenous Knowledge Program. As discussed earlier, however, the

directors of ICIK seem to have more autonomy in their work program. The consortium has their own mission and goals for indigenous knowledge, which they follow in their activities and research. Their only constraint is meeting the needs of their grant providers or funding sources.

Data from the Indigenous Knowledge Program and ICIK case studies, however, did indicate that the current use of the term indigenous is problematic because in practice indigenous knowledge is still commonly understood as knowledge held by indigenous peoples or communities. In addition, the term indigenous is not respected in practice. The term complementary may be a better option for all the case studies.

In addition, the plurality of knowledge within the label indigenous needs to be acknowledged. Therefore the term "knowledges" as Semali and Maretzki prefer to use, is important to use as it highlights the hierarchies of knowledge within indigenous knowledge. Acknowledging knowledges may lead to discussions as to why the NIH prefers to work with structured knowledge over folkloric knowledge and bring attention to local knowledge which are undocumented or orally based.

The issues raised in this section are likely a result of ineffective institutionalization processes established by each case study. This will be discussed in the next section.

C. Processes in the institutionalization of indigenous knowledge

This section analyzes the processes involved in the institutionalization of indigenous knowledge by each case study. Methods of: 1) gathering indigenous

knowledge; 2) Validating indigenous knowledge; and finally the 3) institutionalization of indigenous knowledge are detailed below.

1. Gathering of indigenous knowledge

Informants from each case study state that they allocate ample time to gather indigenous knowledge in the field. They also claim to acknowledge the local governments from the areas/regions they are collecting knowledge from. For instance, the NIH carries out collections using contractors and each contractor works with local officials to collect plants. The NIH gives credit back to the countries in which the plants were collected and sometimes seek local peoples' advice and their validation techniques.

In the Indigenous Knowledge Program staff use a participatory rural appraisal method to collect indigenous knowledge. Watkins says they interviewed local community member's for their knowledge and experiences on indigenous knowledge using video and tape recording. Pidatala adds that generally elders or key community members were interviewed to identify the community's indigenous knowledge. Watkins believes this method of recording the knowledge helped the Indigenous Knowledge Program team accurately and effectively disseminate the knowledge at the World Bank.

Similar to the participatory rural appraisal techniques used by the Indigenous Knowledge Program, ICIK informants mentioned that they use participatory methodologies in which local community members identify their knowledge and develop their own strategies in organizing and communicating it to members outside the community.

As discussed in section B, however, the NIH and the Indigenous Knowledge Program filtered out knowledge relevant to their program and preferred to work with structured knowledge. ICIK is the only case study that did not do this.

2. Validation of indigenous knowledge

Once knowledge is collected locally, all three case studies had different validation processes before institutionalizing them in their respective institutions. As evidenced in the data collected from the NIH case study, the Western scientific method is the NIH's doctrine and applies this method to all forms of medical knowledge. If indigenous knowledge is not validated to the Western scientific method, they cannot co-exist or be acknowledged alongside conventional knowledge.

As discussed in the literature review, although the Western scientific method has in the past produced miracle drugs, like the polio vaccination, in the study of indigenous knowledge the Western scientific method is limiting. The Western scientific method suggests that a biomedical model can be studied in isolation from other systems in its the environment and suggests that there is only one reality or "universal truth" (Ogawa 1995 and Snively and Corsiglia 2000). All forms of knowledge are expected to meet the Western science standards and fit into being the one reality or universal truth.

Indigenous knowledge, however, functions and relies upon the other factors in their environment, and reflects multiple perceptions of reality (Owaga 1995; Nader 1996; and Snively and Corsiglia 2000). Eyzaguirre (2001), for example, says that studying indigenous knowledge out of their original environment may be convenient for conventional scientific researchers; however, it destabilizes the actual function of

indigenous knowledge. This is because indigenous knowledge stripped away from its connection to its environment or other factors such as rituals or religions.[228]

Since the NIH's main focus is in drug discovery and development using the Western scientific method, they deconstruct traditional plants and other species collected in the field to single chemical compounds. Once plants are extracted to their chemical compounds, they are screened against cancer cells, and the chemical compounds (which show a reaction against cancer cells) are further researched in animal models. The traditional plant or species, from which the chemical compound was isolated is lost and may only exist in name.[229] Also, tacit knowledge, as discussed by Polyani (1997), associated with traditional medicine may be lost. Furthermore, the chemical extracts, drugs developed, or genetic sequences of the plant are integrated into NIH's medical databases and become a part of Western or conventional scientific knowledge.

The Indigenous Knowledge Program and ICIK suggest they have different approaches and value systems to validation, such as relying on community-tested practices. For example, in the Indigenous Knowledge Program, Watkins says the program's work with the Tanga AIDS working group, in Tanzania, the working group's knowledge had not been validated by any conventional scientific research.

At ICIK, Semali believes that validation techniques are as simple as a community's continuous use of their knowledge for generations. This belief is reinforced in the consortium's definition of indigenous knowledge, as they say that indigenous knowledge is validated by local community members because it has been used for

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[228] Agrawal (2002) also notes the importance of rituals, religions, and other factors and questions how this knowledge can be databased.

[229] For example, the Hoodia pill originates from the Hoodia plant).

generations and "reflect[s] thousands of years of experimentation and innovation" (Interinstitutional Consortium for Indigenous Knowledge, 2007).

As discussed in chapter VI, on the Penn State case study, he gives an example:

you know this guy, he went to Egypt you know, and when they were excavating and found the mummy there, and made a discovery, I mean, I'm using science to validate a work and then I wonder whether the people who were preserving the mummy for all these years, did they know which way to do it, in the right way so that it is successful? So you can come in a million years and find it? What about those ways? Those are forgotten (Ladi Semali, personal communication, August 9, 2007).

Ironically, Khan also told me the same story from another perspective. Khan believes the discovery of the first human being was an important step in the field of Western science as it explained the origin of human race and explained how all of us are related by a mitochondria's genetic code. Having discovered that mitochondrial DNA is only transferred from mother to child, he says:

all the genetists, hundreds of them, landed in Africa in the great rift valley trying to find out, a mother, a single woman, you the man who the most lucky?....Professor Johansson he was the genetist from University of California, Berkley, now he's at Arizona. He found a piece of rock, complete fossil when this rock, it's a 3 and ½ million year old rock, and he found the bones of an 18 year old woman, he called her Lucy. Her children grew in number…when…there was not enough food for them, so they left Africa as hunter and gather and went to West [and eventually spread around the world, so] you and I, all of those people, six billion on the planet earth are the children of the same mother Lucy (A. Hammed Khan, personal communication, May 25, 2007).

As Semali notes, the story told from the West's perspective does not credit the indigenous methods used to preserve the body or even acknowledge the body's origin by name. The first person in this world is named Lucy because Professor Johansson, a Western scientist, chose the name.

Semali's thoughts coincide with Curry (1997) who write despite its origins, "knowledge is by nature embodied [and that] the value of knowledge, or its utility,

depends on the social context and the historical period in which it was created" (Curry, 1997 in Stromquist and Samoff, 2000, pg. 324). When knowledge is disconnected from its social context or decontextualized it loses its meaning and may not be valid anymore (Agrawal, 2002; Eyzaguirre, 2001; and Stromquist and Samoff, 2000).

Researchers at the NIH also recognize some indigenous validation techniques, as Semali discusses at ICIK and as presented in the literature by Yuan and Lin (2000) and Shankar and Venkatasubramanian (2005). In addition, researchers around the world can submit drugs or procedures they've developed based on indigenous systems to the National Cancer Institute (NCI). They are further evaluated by experts at NCI and as Cragg says they, "see whether they feel if there is something of value…" (Gordon Cragg, personal communication, May 23, 2007).

White also says that are certain local details the NIH acknowledges, such as the season the plant is grown in and any specifics in the cultivation of a plant. It is important that researchers at the NIH recognize this as scholars studying indigenous medicines mention that this recognition is an important first step in conventional medicine because it begins to challenge the concept of a universal truth (Shankar and Venkatasubramanian, 2005, and Yuan and Lin, 2002).

White does, however, say that the local researchers or traditional healers have to prove that these indigenous methods work. In his experience he has found it difficult for them to prove these methods. He says scientific proof, according to the conventional standards, is necessary for researchers at the NIH to understand how indigenous medicines work.

Although the Indigenous Knowledge Program relied on community-tested practices, Watkins says that indigenous knowledge, not validated by Western science, also received skepticism outside of the program. Prakash adds that it difficult to recognize community tested practices alongside conventional validation paradigms. As mentioned in chapter V, on the World Bank case study, Prakash notes that at the World Bank, "senior officials…immediately [ask] is it validated, you know or is it tested? Do you have NIH approval? Do you have WHO approval?" (Siddhartha Prakash, personal communication, July 21, 2007). Prakash, therefore, agrees with Dr. White at the NIH in that Western or conventional scientific evidence is often necessary for indigenous knowledge to recognized alongside conventional knowledge.[230]

Unfortunately, re-validation of indigenous knowledge to the Western scientific method reinforces the, "global intellectual elite …[and indigenous knowledge is forced to] meet tests of scientific reliability designed and implemented by a small elite" (Stromquist and Samoff, 2000) who are mainly located in the Western hemisphere. In addition, integrating indigenous knowledge into the conventional knowledge paradigm continues to marginalize researchers who do not speak English or lack access to top journals (Stromquist and Samoff, 2000). Therefore, the Indigenous Knowledge Program cannot hold true to their goal of including poor people's knowledge in development and the NIH reinforces the dominance of the West in medical science.

ICIK's directors do acknowledge the scientific debate surrounding indigenous knowledge, however, the consortium did not report to use any validation procedures alongside their institutionalization of indigenous knowledge in their research. They also

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[230] When I was interning with the program, I prepared a literature review on the scientific validation of indigenous medicines for a South African Traditional Healers Conference. Indigenous Knowledge Program staff directed to research literature published by the NIH or WHO.

do not believe that indigenous knowledge can be transferred between communities, unless of course, the local communities themselves see the knowledge useful in their local context.

The validation of this knowledge plays an important role in what knowledge is institutionalized in each case study. The NIH and the Indigenous Knowledge Program mainly institutionalized structured knowledge. In the Indigenous Knowledge Program, staff relied on NIH and WHO validation of indigenous knowledge so that they had further Western support for their program. The next section discusses issues surrounding the institutionalization of indigenous knowledge in their respective institutions.

3. Institutionalization of indigenous knowledge

As discussed in the previous section, the institutionalization of indigenous knowledge into an organization's databases, publications, or websites, causes the knowledge to become decontextualized,[231] meaning indigenous knowledge is taken out of its local context, disconnected from processes and factors used in its environment, and stripped down to generalizable knowledge or applications. For example, indigenous knowledge can be reduced to a molecular compound or, "to a few sentences [so that] the complexities and ambiguities of the everyday world disappear and knowledge becomes decontextualized and disembodied" (Stromquist and Samoff, 2000). Therefore, the institutionalization of indigenous knowledge by many international organizations often works against the characteristics of indigenous knowledge (Wangoola, 2000; Agrawal, 2002; and Briggs and Sharp, 2004) and takes away from their original meaning or

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[231] This process is also called as "ex situ conservation" by Agrawal (1995) because it takes the knowledge out of their local environments.

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function. In turn this may lead to indigenous knowledge being misinterpreted or misused in policies or programs.

In addition, processes involved in the institutionalization of indigenous knowledge can show favoritism towards certain forms of knowledge over others and can be seen as simply "marketing" indigenous knowledge globally.[232] Or as Samoff and Stromquist (2001) note, a small group of people, or elite in the North control this knowledge. This can be disadvantageous because some forms of indigenous knowledge will be recognized or valued over others.

From a postcolonial perspective, Briggs and Sharp (2004) also challenge the institutionalization of indigenous knowledge by Western organizations and suggest that it is a form of neo-colonization. For example, they note that practitioners simply treat indigenous knowledge as an "artifact" (Briggs and Sharp 2004 pg. 13) and integrate this knowledge with their work depending on its usability in development. Furthermore, both Briggs and Sharp (2004) and Samoff and Stromquist (2001), note that representing indigenous knowledge in this manner, as a commodity, makes indigenous knowledge un-dynamic, static, and simply seen as a tool which can be delivered quickly for development purposes.[233]

Researchers at the NIH and staff in the Indigenous Knowledge Program have created databases and used other forms of institutionalization measures in which indigenous knowledge has become either decontextualized or separated from its origin. Both institutions also have the philosophy that indigenous knowledge can be

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[232] For example, the Hoodia plant from South Africa is marketed as a diet pill.
[233] Briggs and Sharp (2004) suggest that indigenous knowledge is represented as commodity to further efforts of globalization.

institutionalized in databases, or other instruments, transferred to another setting or mass produced.

In the NIH case study, for example, researchers carry out the collection and extraction of plant and marine organism samples worldwide. In addition, the NCI has created a Natural Products Repository (NPR) which houses around 170, 000 extracts from samples of over 70, 000 plant and 10, 000 marine organisms collected from over 25 countries, as well as over 30, 000 extracts of diverse bacteria and fungi.

Similarly, staff from the Indigenous Knowledge Program have institutionalized indigenous knowledge through their website, databases, *IK Notes*, and other systems. The database, for instance, available on the program's website has approximately 300 indigenous knowledge practices in different areas, such as health, agriculture, natural resource management, education, conflict resolution and others. Different toolkits are also available on the program's website, such as documents and multi-media files, providing case studies and examples on how to identify and integrate indigenous knowledge in development.

Scholars, such as Sillitoe and Bricker (2004) suggest that indigenous knowledge should never be institutionalized in these forms or be mass-produced. They write that indigenous knowledge can only exist in small-scale work conducted at a grassroots level. In addition, they argue that successful small-scale efforts cannot be used to inform or develop international policies or practices because, as also argued by Agrawal (2002), Stromquist and Samoff (2000), and Eyzaguirre (2001), indigenous knowledge loses its functionality when detached from its original environment. In addition, Sillitoe and

Bricker (2004) note that it can take several years to understand how indigenous knowledge can inform development projects in one local area.

The NIH or the Indigenous Knowledge Program, however, could not create a space for indigenous knowledge if they followed Sillitoe and Bricker's (2004) critiques. Their institution's mission and their respective program goals contradict scholars who advocate that indigenous knowledge should not be decontextualized.

At the World Bank, for example, King's (2002) reflection is relevant as he notes the time constraints staff face in their work programs and pressure to produce fast results limit their time for reflection on indigenous knowledge or lessons learned. They need to make quick decisions on whether this knowledge is applicable for their project or not. Samoff and Stromquist (2001) also note that, "the inclination to equate information and knowledge[234] is reinforced by the sense that decision-makers have very short attention spans and that they are unwilling or unlikely to read more than a few sentences on any topic" (Samoff and Stromquist, 2001 pg. 637). Samoff and Stromquist (2001) suggest this may be the reason the Indigenous Knowledge Program's database reduces indigenous knowledge to, "a very short summary of research findings followed by a statement of lessons learned and implication for action" (Samoff and Stromquist, 2001 pg. 651). They argue that this type of data collection limits the appropriate representation of indigenous knowledge's local context and local peoples experiences.

Prakash agrees and says that task managers did find it difficult to seek out indigenous knowledge, research it for their projects, and integrate it. He infers that it was vital to their program's survival to reduce indigenous knowledge practices to a few

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[234] Samoff and Stromquist (2001) note that when knowledge becomes information it is reduced to a "fact" and again reinforces the idea that knowledge is seen as static or undynamic.

sentences or bullet points as this was easier to convey to task team leaders or project managers at the World Bank.

Watkins also notes the World Bank staff had little time for reflection and that many staff felt the knowledge initiatives were too disconnected from the institution's focus on operational work and, "very academic" (Sharon Watkins, personal communication, July 27, 2007).[235] She believes, however, that task managers needed to be more proactive in seeking out indigenous knowledge of a country or community before implementing a project. She says that it should be a natural part of development work. If World Bank staff were more proactive, as Watkins suggests, then it would address the critiques raised by Briggs and Sharp (2004) and Samoff and Stromquist (2001) and orient the development process toward being more holistic.

The rigidity of the organizational management style to produce fast information and results may have been related to leadership issues at the World Bank. Informants mentioned that they were frustrated at the inflexibility of the system in which they were working and Watkins mentioned that they had to rework her skill sets to conform to Wolfowitz's new mission for Africa (which focused on generating quantitative results). This is important at the World Bank, as the management style has changed over the last three years – from Wolfensohn (who had a decentralized management style) to Wolfowitz (who had a centralized management style), and finally to Zeollick (recently appointed president at the World Bank).

ICIK on the other hand aligns more with Sillitoe and Bricker's (2004) thoughts on the institutionalization of indigenous knowledge. They do not institutionalize indigenous

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[235] Meaning the knowledge initiative projects were too theoretical in nature and not practical enough for development.

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knowledge in databases or other standardized organization methods, but rather try to more holistically institutionalize and disseminate indigenous knowledge at Penn State by integrating indigenous knowledge into on-going faculty research. For instance, their Interdisciplinary Working Group works with institutions and rural communities in countries of Tanzania, Kenya, and Uganda, to work on the Millennium Development Goals using indigenous knowledge. Semali says that their working group is unique because they have been able bring together expertise from all over Penn State, from various disciplines, to work together in using indigenous knowledge to achieve the Millennium Development Goals.

ICIK has, however, created a resource library and produced books on the topic of indigenous knowledge which can be seen to decontextualize indigenous knowledge and exclude local community voices as local communities are not involved in these publication processes. This, however, may change in the future, as Semali and Maretzki noted that they are encouraging indigenous knowledge holders to present at conferences, contribute to publications (through art and other non-formal documents), and be more active in contributing to faculty research (such as their working groups).

4. Conclusion for section C

ICIK is also the only case study to closely preserve indigenous knowledge in its original form, which closely follows Geertz's (1983) that knowledge cannot be generalized or taken out of context. The Indigenous Knowledge Program and the NIH extract information of their interest and institutionalize it according to their standards. In addition, the NIH case study reinforces the challenges indigenous knowledge faces in the

literature regarding scientific validation. For instance, the NIH's strict validation processes, which apply to all forms of medical knowledge, are very limiting for indigenous knowledge. Their validation process is NIH's doctrine and makes it difficult for invalidated indigenous knowledge to co-exist or be acknowledged with conventional knowledge.

The NIH also recognizes some indigenous validation techniques. White does, however, say that the local researchers or traditional healers have to prove that these indigenous methods work to their Western standards. In addition, although the Indigenous Knowledge Program preferred local communities to validate their own indigenous knowledge, Watkins says that indigenous knowledge, not validated by Western science, received similar skepticism outside of the Indigenous Knowledge program.

Further exploring and understanding indigenous validation techniques will help in the appropriate institutionalization of indigenous knowledge. Scholars, such as Shankar and Venkatasubramanian (2005) and Yuan and Lin (2002) who are working to translate indigenous validation techniques to conventional standards may help this movement. Their work, however, should not be limited to structured knowledge and should include translating validation procedures transmitted orally or in non-formal documents (i.e. art). In this way, indigenous knowledge may be more holistically understand by Western institutions and not reduced to, as Samoff and Stromquist (2001) note, a "fact."

D. Conclusions for discussion

In reflection of the data collected the challenge common to all the case studies and, which can be generalized for the representation of indigenous knowledge in the Western hemisphere, is the paradigm clash between indigenous and conventional knowledge and the differences in their worldviews. This challenge needs to be addressed and in turn may facilitate the issues raised in what indigenous is and how it is institutionalized.

For instance, although the World Bank staff represent many different countries, in order to work in a conventional development paradigm, they often leave behind their indigenous cultures and are educated in conventional knowledge.[236] Pidatala reinforces this thought by noting that staff at the World Bank are educated mainly in conventional knowledge paradigms, and therefore, it is difficult for them to value indigenous knowledge because it is thought of as traditional, backward, or primitive compared to conventional knowledge or modern systems of technology. Therefore, Pidatala says that most World Bank staff are educated to question the validity and relevance of knowledge outside the conventional knowledge paradigms.

Prakash also says that the concept of looking within one's own country for development solutions is a new concept for governments to discuss with international donors like the World Bank. They are used to the World Bank coming with new technologies and Western based ideas and are not expected to voice their own indigenous development practices. Prakash adds that World Bank staff need to spend more time in

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[236] Kawakami (1999) writes that in order for Native Hawaiian students to succeed they are forced to leave their culture at home and adopt to the values and behaviors that equate to being successful in the Western World[236] (Kawakami 1999); perhaps similar experiences are present among World Bank staff from developing countries.

the field with local communities. He also says that the World Bank staff need to listen to what local communities want for their development and see how best the World Bank objectives can meet the local needs.

At ICIK, Maretzki says that indigenous knowledge is not a core interest in academia and as presented in chapter VI, on the Penn State case study, describes generating faculty interest in indigenous knowledge as, "sort of like pulling teeth" (Audrey Maretzki, personal communication, August 9, 2007). Maretzki agrees with Couture (2000) who blames academia's established academic disciplines and ivory tower mentality for this. She adds that it is scary for a faculty member to venture over to indigenous knowledge because they first need to establish themselves in the core of the discipline. After faculty establish themselves in their disciplines, she says then indigenous knowledge can be considered as a supplement to their on-going research.

Semali adds that some faculty also feel they do not have any experience or knowledge to contribute to the field of indigenous knowledge. As discussed in chapter VI, on the Penn State case study, Semali says that especially "white Americans" (Ladi Semali, personal communication, August 9, 2007) feel that they are not experts in this area. He says that faculty do not understand that ICIK's mission is simply to bring different worldviews or place-based knowledge to the academy, and "White Americans" have this to offer as well.

The researchers at the NIH need to prove the alternative or traditional medicines are on par with conventional medical systems. Therefore, they re-validate indigenous medicines to confirm its validity and isolate indigenous medicines to single chemical compounds. In the process of isolating out the single chemical compound, however, the

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holistic aspects of the indigenous medicine is not captured. In addition, a single chemical compound cannot regenerate the holistic aspects of an indigenous medicine.

Despite the challenges the case studies encountered, at the global level each case study highlighted knowledge outside the conventional knowledge paradigm and contributed to discussing a new category of knowledge in their organizations (Srikantaiah and Rueger (forthcoming)). The terms indigenous, natural, complementary, or alternative, gave the program a name and allowed these forms of knowledge to exist in development.

In addition, unlike many scholars from a post-colonial perspective, who suggest that institutionalizing indigenous knowledge decontextualizes it out of its local context, the validation and institutionalization of indigenous knowledge outside of its local environment also exposes diverse and cultural knowledge to institutions mainly operating in conventional knowledge paradigms.

It is important to for these organizations to continue recognizing the plurality and diversity of knowledge in our world and acknowledge this in their work. Recognizing the diversity of knowledge will also help the marginalized or poor to be a part of the global dialogues. In addition to helping empower poor people and allowing them to participate in global discourses and activities, these forms of knowledge are an important resource for new approaches. The diversity of knowledge within indigenous knowledge, however, needs to be better addressed and appropriate validation and institutionalization methods need to be better explored.

Table 7.1 summarizes the major findings.

	Finding 1: Aligning to the definition set for indigenous knowledge	Finding 2: Renaming indigenous knowledge	Finding 3: Validation of indigenous knowledge	Finding 4: Institutionalization of indigenous knowledge
Natural Products Branch, the National Institutes of Health	Definition set for natural products or alternative and complementary medicine aligns with the identification of the knowledge from its respective countries.	The NIH does not encounter any problems with their use of terminology. The term "complementary" proves to be successful in appropriately representing the knowledge of interest.	The NIH strictly follows the Western Scientific Method in their validation of natural products or alternative and complementary medicine.	Institutionalization of natural products or alternative and complementary medicines is problematic as the knowledge is reduced to a chemical compound and integrated into Western science knowledge based databases. The true form of the original medicine or plant is not fully considered.
Indigenous Knowledge Program, The World Bank	Definition set for indigenous knowledge did not align with the identification, gathering, and institutionalization of indigenous knowledge at the World Bank. Definition set for indigenous knowledge is broad, but the knowledge selected as indigenous knowledge reflected the practitioner's bias and the World Bank's interest in knowledge validated by the Western Scientific Method.	The term "indigenous" received resistance within the World Bank and was interchangeably referred to as "voodoo" and "witchcraft." In addition, the World Bank staff commonly associated "indigenous" knowledge with indigenous peoples. New terminology needs to be explored for this case study.	Indigenous Knowledge Program staff claimed to rely on community-tested practices, however, in actuality the program preferred to work with indigenous knowledge validated to Western Science. They often relied on WHO and NIH data to support their work on indigenous knowledge.	Institutionalization of indigenous knowledge worked against the characteristics of indigenous knowledge as the Program staff also reduced the knowledge to "knowledge nuggets" for their databases and websites. In addition, only some indigenous knowledge case studies are highlighted in the program.
Interinstitutional Consortium for Indigenous Knowledge, Penn State University	Definition set for indigenous knowledge reflects the indigenous knowledge identified, gathered, and institutionalized	The term "indigenous" is misunderstood by faculty and staff at Penn State and many do not consider it a part	ICIK does not support the validation frameworks generated by Western science.	ICIK does a fair job in gathering, validating, and institutionalizing indigenous knowledge at Penn State. They,

through ICIK.	of their research. In addition, ICIK staff are concerned that the termination of the World Bank's program may impact their program and use of "indigenous." Semali and Maretzki are seeking alternatives to the term "indigenous."	Instead, they prefer community-tested practices and support work collaborative research between Western scientists and indigenous knowledge holders.	however, also institutionalize indigenous knowledge outside their local context by publishing the knowledge in journals, books, and conference proceedings. These documentation methods may be unfamiliar to the indigenous knowledge holders.

VIII. Conclusions

In this section I present the future directions for each case study, reflect on any biases or assumptions I had while conducting the research, and, based on the findings from my research, the future opportunities for my personal research in the area of indigenous knowledge.

A. Future directions for case studies

It is evident that all three case studies have created opportunities for indigenous knowledge in their respective fields or institutions. For example, both Khan and Cragg say there is so much opportunity for drug discovery and development based on indigenous knowledge (and now also from bacteria and fungi). Furthermore, White believes that the connection between indigenous and conventional knowledge will become stronger as people gain knowledge of both systems of medicine. He believes that when this happens the two systems can be used in a complementary fashion.

Khan did note that he would like more ethnic diversity represented among the researchers at the NIH. He mentions that minority researchers' voice and participation will allow for research in areas concerned to their ethnic populations as opposed to mandates from Congress (Garnett, 1999). This in turn may provide further opportunities for the study of indigenous knowledge. The opportunities for indigenous knowledge at the NIH, however, remain limited to their validity in the Western scientific paradigm. At ICIK, Maretzki says that the working groups, which started recently, is creating opportunities at Penn State because indigenous knowledge is being directly incorporated into on-going faculty research in a number of disciplines. In addition, Morias says the

working group has created a research framework in which faculty can apply for grants or conduct research on indigenous knowledge without conforming to the needs of their academic departments. Maretzki would also like the working group to expand and for the group's members to publish more peer reviewed journal articles.

Although all institutions faced some challenges working with indigenous knowledge, the World Bank's Indigenous Knowledge Program suffered the most. Therefore, the opportunities to institutionalize indigenous knowledge at the World Bank were limited and only occurred under Wolfensohn and Gorjestani's leadership. Past activities did create some opportunities and informants did acknowledge that opportunities for indigenous knowledge and development still exist outside the World Bank.

B. Reflecting on personal biases and assumptions

In my methods section, I mentioned that I may have certain assumptions or biases towards one of my case studies -- the Indigenous Knowledge Program at World Bank. Since I worked in this program, I am more intimately associated with the program's work (I have contributed to some of their projects) and know the program staff on a close collegial level. Therefore, I was concerned that this may impact the data I collect because my research questions may be tailored to my experience at the World Bank, and that program staff may feel more comfortable during the interviews. In addition, I thought I would analyze the World Bank data more introspectively, than the other case studies, because I of my working experience in the institution.

Since I acknowledged this assumption at the start of my research, I worked hard to collect data from each case study evenly and objectively. I also made sure that I did not study the World Bank case study first, but rather started with the NIH. This allowed me to immerse myself in an institution I have not worked in, and allowed me to verify that my research questions were appropriate for institutions outside of the World Bank.

In reflection of the data I collected and my analysis, although I am more intimately connected to the data I collected at the World Bank, I believe I have thoroughly researched and understood the other case studies. In addition, as presented in my analysis, I have drawn connections between the work at the World Bank, NIH, and Penn State on the topic of indigenous knowledge which will help each case study understand the interconnectedness between indigenous knowledge programs in the United States.

C. Future research

The findings from this research study reveal that, in general, the identification and institutionalization of indigenous knowledge is skewed to the biases of the practitioner or researcher from the West and reinforce critiques raised by Agrawal (2002), Briggs and Sharp (2004), Klees (2002), Samoff and Stromquist (2001), and Stromquist and Samoff (2000). Although the directors of ICIK work hard not to decontextualize indigenous knowledge, like the other case studies, they are also accountable for working with indigenous knowledge out of its local context, and even label the knowledge to meet the needs of their institution. The Western scientific method also continues to be

predominant validation technique used to validate indigenous knowledge at the NIH and the World Bank.

In addition, informants from all three case studies did indicate that they encountered challenges when introducing and using indigenous knowledge in their work. For instance at the NIH, White mentioned that Western scientists will not accept or attempt to understand indigenous knowledge unless it is presented to them in their language. At ICIK, Semali expressed concern that his White American colleagues felt they did not have anything to contribute to the consortium because they do not have any indigenous knowledge. And in the Indigenous Knowledge Program, both Pidatala and Watkins mentioned that World Bank staff were skeptical in the use of indigenous knowledge in their work. Pidatala says that staff would call indigenous knowledge "bogus" and question its validity in Western development. Likewise, Watkins says she remembers staff calling indigenous knowledge as "voodoo" and say it was scary for the World Bank to be interested in knowledge not validated by Western science.

In reflection of the findings and critiques raised by scholars in the field, I would like to continue my research, in the area of indigenous knowledge, in two directions: 1) Begin understanding the role of information communication technologies in appropriately capturing and institutionalizing indigenous knowledge in Western institutions; and 2) Building on the ICIK case study, continue studying the integration of indigenous knowledge in higher education institutions.

1. Information communication technologies

Information communication technologies have been used in the field of participatory research; however, they are now also being to create databases for indigenous knowledge and other marginalized knowledge (Jain, 2006; Muswazi, 2001; Srinivasan, 2006; and van der Velden, 2002). For instance, marginalized community members or indigenous knowledge holders are using information communication technologies to create their own databases so they can share their knowledge with researchers or development practitioners.

Information communication technology is currently being used in many Native American communities in the United States to preserve and document their traditions, languages (orally based), and songs (Srinivasan, 2006). In addition, in Sri Lanka women in rural communities are using digital photography and video to preserve Ayurvedic medicinal recipes traditionally written on palm leaves (Mahindalpala, 2003)[237] or orally passed from generation to generation. Another example is Insight, an organization based in the UK, who use participatory video is used as a tool to empower poor or marginalized people (Insight Share, 2007).

This method will definitely assist in the institutionalization of indigenous knowledge in each case study, as indigenous knowledge holders themselves identify, define, and perhaps label, their knowledge. For example, the method of participatory rural appraisals (PRA), used by the World Bank, can further engage the local community

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[237] In cinema, the documentary *Born into Brothels* also illustrates the power of photography/videography. The children who are born in brothels in Mumbai are given disposable cameras and asked to take pictures of their lives. Based on the photographs, each child creates a portfolio illustrating their lives living in the brothels.

members and eliminates the "middle man" or practitioner or researcher in the institutionalization of indigenous knowledge (Chambers, 1994). Also, this methodology may also support better research in the area of indigenous knowledge. For instance, Klees (2002) notes it is important for local communities to engage in their own research because institutions, like the World Bank, may misinterpret or skew the data to meet their findings.

The World Bank is an ideal organization to start this type of initiative, as they have both the money and technology to lend. For example, when I interned with the Indigenous Knowledge Program, I was involved in the development of a distance learning course with Uganda, Tanzania, India, and Sri Lanka. The facilities and technical staff available to conduct the distance learning course were enormous and these resources can definitely be channeled to local communities.

Many scholars, however, critique information communication technologies because they are generally developed in the West and citizens in developing countries or the poor may become dependent on the West as their technology providers (Escobar, 1995; Stromquist and Samoff, 2000; Samoff and Stromquist, 2001; King, 2002). Samoff and Stromquist (2001) add that since technology changes in the blink of an eye, the poor or citizens in developing countries will always be behind in the technology movement. Samoff and Stromquist (2001), however, do note that it is not technology that is the problem, but rather it is the differences in power or hierarchies of power that people have created. To further elaborate, the West has dominated the field of science and technology and has not provided opportunities for the poor or citizens in developing countries to be a part of science and technology discourses.

In addition, the issue surrounding Western scientific validation is still not resolved because the information communication technology methodology relies on the local community's validation. Therefore, Western scientists will still not appreciate indigenous knowledge communicated form a community not working under the Western science paradigm.

The exchange of knowledge through information communication technologies, however, may allow better dialogues between Western and local scientists (education in both Western and indigenous knowledge) – thus, filling in the gap White mentions is present at the NIH. Scholars such as Aikenhead (1996), Jegede (1999), Kawagley, O. A., Norris-Tull, D., & Norris-Tull, R.A. (1998), Ogawa (1995), and Siegel (2002) have started conversations in this area. For instance, in the literature review, Norton, Pawluk, and Sandor (1998) suggest for the creation of collaborative efforts to bridge gaps between the two science knowledge forms and find funds to design policies that recognize indigenous systems of science and sustain them. Jegede (1999) especially believes that uncovering these differences is fundamental to help bridge gaps between the two knowledge systems because it will allow conventional knowledge to understand the mechanisms or the way indigenous knowledge works. The sustainability of the indigenous knowledge alongside the conventional knowledge paradigm, however, is still unknown.

I also recognize that there are complexities in pursuing research in this area and will consider issues of access to technology, training local community members, and potential dependency issues.

2. Indigenous knowledge in higher education

Another area I would like to continue my research is in exploring the integration of indigenous knowledge into higher education. In order for indigenous science thought processes or scientific methods to be on equal par to conventional knowledge, members of, or staff, in each case study needs to realize that indigenous knowledge differs from conventional knowledge in epistemology, worldviews, and belief systems (Aikenhead, 1996; Owaga, 1995). In addition, they need to understand that indigenous knowledge is beneficial in their fields or work programs. The field of science and technology should not assume that one model can be used to in all contexts. If these issues are addressed and discussed, then there is a better possibility for indigenous scientific methods or processes to co-exist with conventional knowledge.

During my visit to ICIK at Penn State, I appreciated how ICIK is challenging conventional academic disciplines and introducing indigenous knowledge into the academy. This is a difficult process because as Couture (200) notes, Universities generally focus on conventional academic disciplines and the ivory tower environments make it difficult to integrate indigenous knowledge into the academy. It is encouraging, however, to know that a consortium's like ICIK is fighting these structures.

ICIK is not alone in this is battle. At the University of Maryland, Dr. Robert Yuan, professor of Microbiology, has restructured traditional undergraduate microbiology courses and created a program called *The Diversity Notebook*. In his program undergraduate students learn that the basic principals of biology exist in every culture, however, each culture interprets them through different worldviews or scientific

paradigms.[238]   In Canada, Ng (2000) teaches college level health course on both conventional and alternative medical practices. She writes that addressing both allows students to see the multiple worldviews in health and the cultures they come from. Finally, in India, Anil Gupta at the Indian Institute of Management is also working on recognizing indigenous science methods and processes in research. In the center he directs, he recognizes grassroots innovators in the field of science and technology and bridges their knowledge with conventional science knowledge.

In further studying these programs and the research these scholars are contributing this field, I believe it will help facilitate the understanding of indigenous scientific methods and processes in the conventional knowledge paradigms. In addition, as White, from the NIH, mentions the better understanding scientists have of both conventional and indigenous or alternative knowledge, the faster we can progress in our dialogues and decrease the resistance alternative knowledge face in the conventional paradigm.

D. Conclusion

Over the last two decades indigenous knowledge has been a part of global discourses in development, medicine, and education. Therefore, the research study investigated the representation and use of indigenous knowledge by globally operating institutions in the areas of development, medicine, and education located in the Western hemisphere. Although the case studies has made an important step in recognizing marginalized knowledge in conventional knowledge paradigms, there still exists many challenges that need to be addressed in order for these knowledge forms to be

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[238] See http://www.life.umd.edu/cbmg/faculty/yuan/yuan2.html (Last accessed on February 21, 2008)

appropriately recognized. Future research in the area of information communication technology and higher education may help alleviate these challenges and progress the movement for indigenous knowledge globally.

IX. Appendix A – Interview Questions

Introduction to Interview

Thank you for agreeing to be interviewed today. My name is Deepa Srikantaiah and as part of my graduate program in the College of Education I am researching the use of indigenous knowledge in institutions in the Western Hemisphere.

My reason for doing this interview is to collect in-depth information about the role and use of indigenous knowledge in your work. I am interested to see what opportunities exist for the fostering and development of indigenous knowledge at your institution; yet at the same time I also am curious to know if you experience any challenges and difficulties in doing this. Your participation in this study and the data I collect could help you further advocate for indigenous knowledge in your respective institution. In addition, hopefully other programs in the Western hemisphere will also benefit from this study.

Information you provide will only be used for purposes of this study. If you request, information that I plan to collect during your interview will remain confidential. Your real name will not be revealed or referenced. Otherwise, I will use your name.

With your permission the interviews will be audio-taped for me to reference during my data analysis. Only my faculty advisor and I will have access or hear the recording of the interviews. If you wish not to be recorded, please let me know. Do you give me permission to record the interview?

The interview will last 90 minutes. Do you have any additional questions?
Thank you again for taking the time to be a part of my research study.

Notes before beginning the interview process:

-Make sure informant sign the consent form
-Make sure informant have reviewed appropriate external disclosure policies
-Turn on tape recorder after receiving permission from the informant

A. Interview Questions

I.   Background Questions
   a. Name
   b. Educational experience
   c. Work experience
   d. Nationality/citizenship
   e. Country of origin/ethnicity
   f. Languages spoken
   g. Current title and role in their respective institution
      i. Process and arrival in this position
   h. Interest in indigenous knowledge systems

II.   Work Program
   a. Please describe how your institution/program uses indigenous knowledge systems in their work program
      i. Where is your program located?
      ii. What is their mission?
      iii. What are the program's objectives?
      iv. What are the outcomes? Expected outcomes?
      v. What is their rationale for using or mainstreaming indigenous knowledge systems?

   b. Please describe the activities or projects you have participated in at your institution
      i. Your role and duties
      ii. Program objectives
      iii. Program outcomes
      iv. Additional program details (i.e. length or future directions)

III.   Definition of indigenous knowledge
   a. How does your program or initiative define indigenous knowledge?
   b. Do they use other nomenclature for indigenous knowledge?
      i. If yes, please specify.

IV.   Representation and institutionalization of indigenous knowledge
   a. What is recognized as indigenous knowledge in your program or initiative?
   b. What is not considered as indigenous knowledge?
   c. What validation procedures or processes do you use to institutionalize indigenous knowledge in your initiative or program?

V.   Opportunities and Challenges
   a.   What opportunities do you see for indigenous knowledge systems in your institution?
        i.   In terms of the institution's mission (value of mainstreaming indigenous knowledge systems alongside conventional knowledge systems)
        ii. In your work program and projects
   b.   What challenges do you see for indigenous knowledge systems in your institution?
        i.   In terms of the institution's mission
        ii. In your work programs or projects

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