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Surveys

Biocultural Design: A New Conceptual Framework for Sustainable Development in Rural Indigenous and Local Communities

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Abstract

New approaches for sustainable development in rural indigenous and local communities have emerged that are rooted in their distinct cultural identities and claims for greater control over land, development and identity. One such approach is that of biocultural heritage, which emerged out of work to document biocultural diversity undertaken in part by members of the Commission on Environmental, Economic and Social Policy (CEESP) of the International Union for Conservation of Nature (IUCN). CEESP members have developed this work over the past twenty-five years, both through work with the Convention on Biological Diversity (CBD) and other policy forums, but also through the operationalization of rural development policies and programs.

One area that has not been fully examined, however, is the contribution of biocultural heritage to local processes of innovation that can explicitly meet communities' contemporary needs and objectives. This paper presents a new approach called 'biocultural design' and seeks to open a conversation about how endogenous innovation could support sustainable development in rural indigenous and local communities. By introducing design thinking to the field of biocultural heritage conservation, biocultural design offers a process for indigenous and local communities to pursue aspirations of self-determination and endogenous development through product/service innovation. It is an approach that may enhance communities' adaptive capacity in responding to dynamic and changing environments and IUCN's goal to deploy nature-based solutions to global challenges in the next quadrennial period.

Keywords: Biocultural Diversity, Biocultural Heritage, Biocultural Design, Sustainable Rural Development, Endogenous Development, Capability Approach.

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1. SITUATING BIOCULTURAL DESIGN

Dominant approaches to conservation and development are based on a historical perception of rural regions as sources of natural resources, labour or environmental services. The outcomes of such approaches have often resulted in diminished environments and disenfranchised populations (e.g. Northern First Nations, Indigenous Peoples, Small/Peasant Farmers). Consequently, many rural indigenous and local communities are proposing alternative approaches. Such approaches are often rooted in their distinct cultural identities and claims for greater control over land, development and identity now and in the future.

Establishing economic opportunities that meet the goals of Indigenous and other rural peoples, which may include a wide range of economic, political, cultural, ecological and social objectives, and are also viable businesses or income generating activities is undeniably challenging. Yet, there are increasing examples of communities who believe negotiating such a path is essential to the survival and wellbeing of their societies (*c.f.* Berkes & Davidson-Hunt, 2007; Davidson-Hunt & Turner, 2012; Davidson-Hunt & Berkes, 2010).

These priorities were clearly articulated in the recent Indigenous Peoples International Declaration on Self-Determination and Sustainable Development[1] prepared for the June 2012 Rio+20 Summit. It affirms the cultural belief systems and worldviews of Indigenous Peoples as fundamental to sustainable development, which must also be grounded in the full exercise of Indigenous Peoples' human and collective rights. Finally, the declaration also prioritises strengthening diverse local economies, which "provide sustainable local livelihoods, community solidarity and are critical components of resilient ecosystems" (Article 3), and territorial management in order to improve the quality of life and wellbeing of Indigenous Peoples and societies.

Biocultural diversity and heritage has provided a focus for many members of the Commission on Environmental, Economic and Social Policy (CEESP) of the IUCN during the past twenty-five years. The biocultural heritage framework is also relevant to the future direction proposed by IUCN in the 2013-16 programme that will focus on 'deploying nature-based solutions to global challenges in climate, food and development' (IUCN, 2012). This paper opens a conversation about biocultural design that brings together the insights gained through a focus on biocultural diversity and heritage with a design approach to innovation. We do this by bringing together work carried out in recent times on the conceptual framings of biocultural diversity and heritage regarding adaptive capacity, with insights on processes of innovation from the field of design.

In section 2, we begin by presenting an overview of the concepts of biocultural diversity as developed in the field of conservation. In the literature, biocultural diversity is often used as an index, or measure, to assess geographical regions in terms of the linkages between biological, cultural and linguistic diversity (Gorenflo *et al.*, 2012; Harmon, 1996; Sutherland, 2003). Such an index allows for a comparison of biocultural diversity across regions, its loss over time, and approaches to support its conservation. In parallel, 'collective bio-cultural heritage' is a conceptual framework for endogenous, or indigenous, approaches to sustainable development (Swiderska, 2006). This framework provides a focus on the linkages between the knowledge, innovations and practices of Indigenous and local communities and their inextricable linkages to territory, economy, cultural and spiritual values, customary laws and biological diversity (*ibid.*, p.3).

CEESP has been active in supporting the development of this conceptual framework through their work with the Convention on Biological Diversity (CBD), and other policy forums, along with its implementation as an approach for sustainable development in rural indigenous and local communities. However, it should be recognized that for Indigenous Peoples, cultural, biological and linguistic diversities are intrinsically linked, as are environment and development. The purpose of this section is to review the origins of the terms biocultural diversity and heritage as used by academics and increasingly in the policies of governments, NGOs and UN agencies. While much of this work has been undertaken with indigenous and local communities, this review reflects the literature on these concepts and should not be misconstrued as an indigenous perspective on questions related to environment, development or conservation.

In Section 3, our goal is to utilize design thinking to propose an endogenous approach for biocultural innovation, rooted in the materials, values and creativity of local communities, to support sustainable livelihoods. We have termed this approach biocultural design. Our thinking stems from the work of Oosterlaken (2009) and others (e.g. Melles *et al.*, 2011) who are attempting to reorient

1 IWGIA: International Work Group for Indigenous Affairs – http://www.iwgia.org/news/search-news?news_id=542

the innovative capacity of design thinking toward addressing the needs of marginalized populations through new approaches to design thinking and practice. Their work, and ours in turn, draws on that of Sen (1999) who suggests that development – expanding the life opportunities that people can enjoy – is moved forward by people mobilizing their current resources and abilities to shape their opportunities in the future. Biocultural heritage offers a dynamic, rich set of resources that many rural indigenous and local communities are using in creative ways to meet their current needs, including income generation, and thereby shape the future of their communities. Many of the contemporary challenges faced by such societies, including limited livelihood opportunities, lack of access to basis public services, urban migration and climate change, are what have been called 'wicked problems' (Buchanan, 1992) and require new thinking and new approaches in order to move toward solutions. We propose biocultural design as one tool for developing products and services that some communities may find helpful in mobilizing biocultural heritage to address contemporary needs and challenges. We draw the review to a close with some concluding remarks on the potential contribution of biocultural design to support communities in undertaking development on their own terms.

2. BIOCULTURAL DIVERSITY

2.1 ORIGINS AND DEFINITION

2.1.1 EMERGENCE OF A CONCEPTUAL FRAMEWORK

The conceptual framework of biocultural diversity draws upon multiple disciplinary roots with a common interest in understanding the relationship between biological, linguistic and cultural diversity. It builds upon a long-standing interest in understanding the interaction between nature and culture that goes back to Kroeber's (1963[1939]) mapping of the linkages between cultural and natural areas, Steward's (1955) work on cultural ecology, and Sauer's (1956) work on cultural landscapes. These ideas were reflected in the field of heritage conservation through a discussion regarding the relationship between natural and cultural heritage during the 1970's and 1980's (Rössler, 2003; 2006). In 1993, the category of cultural landscape was introduced as a type of cultural nomination for World Heritage Sites. This provided recognition to landscape form and function, along with the symbolic associations that emerge out of the relationship between nature and culture (Mitchell *et al.*, 2009).

While heritage conservation focused on landscapes, a parallel interest in the relationship between people and organisms was developing through the interdisciplinary study of ethnobiology (Hunn, 2007; 2008). This work has been largely descriptive with a focus on what people know about natural organisms. However, a focus on traditional ecological knowledge in the late 1990's provided a broader perspective for considering knowledge systems about organisms and the relationships among organisms (Berkes, 2012). While the former often focused on knowledge as heritage and conservation as the solution to the loss of knowledge, the latter considered knowledge systems to be dynamic and relevant to endogenous processes of development (Posey *et al.*, 1984). A spatial approach to cultural and linguistic diversity, cultural heritage, traditional knowledge and endogenous development are important conceptual roots of the biocultural diversity framework.

In the 1990s, two discrete processes of mapping brought together spatial patterns of biological diversity with those of cultural and linguistic diversity. Throughout the 1980s the environmental conservation movement raised the profile of biological extinctions from the level of marginal concern to one of a recognized, global crisis (Myers *et al.*, 2000). A series of maps that showed the remaining areas of high biological diversity were used as a tool during this decade to help visualize the extinction crisis and set priorities and targets for conservation. As these maps became widely available, Harmon (1996) overlaid linguistic and culture area maps onto maps of biological diversity "hotspots" and found many of the remaining areas of biodiversity occurred in the territories of Indigenous Peoples (see Gorenflo *et al.*, 2012 for a review of this literature).

As the Inter-American Commission on Human Rights (2009) notes, "Many indigenous and tribal peoples live in areas rich in living and non-living resources, including forests that contain abundant biodiversity, water, and minerals" (p.197). Natural resource abundance cared for by Indigenous Peoples over generations became coveted for conservation and development. Increased consumption at the global level has focused much attention on these areas of natural resources and placed disproportionate pressures on Indigenous Peoples' lands, territories, and natural resources. As collectives, Indigenous Peoples depend on their lands and the relationship they have to those lands, territories, and natural resources for the survival of their distinct cultures, livelihoods, and traditions (Wiggins, 1993).

These issues motivated academics, NGOs, and others to bring together different streams of research, action and advocacy under the conceptual umbrella of biocultural diversity. The mounting interest in biocultural diversity is evidenced through an examination of Google Scholar citations over a number of decades (Table 1). By the 2000s, biocultural diversity was becoming a useful proxy for expressing the linkages between biological and cultural diversity (Maffi, 2005).

Table 1. Number of Google Scholar hits between 1980 and 2012.

Timeframe	Term	Number of hits
1980-1990	Biocultural	2,010
	Biocultural diversity	524
1991-2000	Biocultural	4,170
	Biocultural diversity	1,620
2001-2012	Biocultural	14,600
	Biocultural diversity	7,280

2.1.2 DEFINITION

Biocultural diversity is defined by the Global Diversity Foundation[2] as, "...the total variety of the world's cultures and natural environments." Integral to the concept is the recognition that, "Their co-evolution over time has generated local ecological knowledge and practice: a vital reservoir of experience, understanding and skills that help communities to manage their resources now and in the future." This definition is similar to that posited by Maffi (2005; 2010) and others (c.f. Maffi, 2001; also Section 2.2.2), including many involved in IUCN and CEESP who have worked over the past decade to construct a unique transdisciplinary program of work related to the recognition and preservation of biocultural diversity.

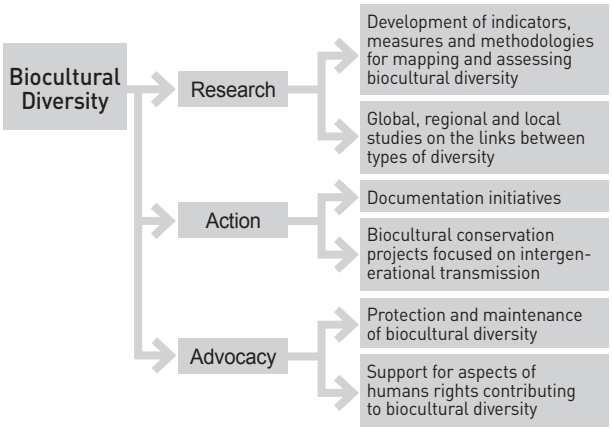

Figure 1. Summary of the research-action-advocacy agenda of Biocultural Diversity drawn from Maffi (2001; 2005) and Maffi and Woodley (2010).

2.2 APPLICATIONS

2.2.1 PROGRAM OF WORK AND KEY INSTITUTIONAL PLAYERS

Biocultural diversity originated as a metric to document, compare and analyze the linkages between biological, linguistic and cultural diversity across regions and over time (Gorenflo *et al.*, 2012; Harmon, 1996; Sutherland, 2003) and became a transdisciplinary framework for both scholarship and action. The framework retains features reflecting its origins including: a strong, almost exclusive, focus on local and Indigenous Peoples; an emphasis on language over other aspects of culture and identity; and, a concern for conservation. Notably, the scholarship and practice has utilized the dominant discourses of conservation biology, including its focus on extinction, crisis, and loss (e.g. Soulé, 1985). Biocultural diversity also makes use of the "hotspot" identification approach developed by conservation biology to establish priorities for action and identify threats to biological diversity.

The impetus for framing biocultural diversity in terms of conservation is based on the observation that the global species extinction crisis is mirrored by a global cultural and linguistic extinction crisis (Gorenflo *et al.*, 2012; Harmon, 1996; Maffi, 2005; Sutherland, 2003). Identified threats stem from diverse sources. Summarised by Woodley (2010, pp.131-132), they include environmental degradation and exploitation, economic development, factors related to tenure and governance, and acculturation and socio-economic change. She concludes:

> "Changing livelihoods, worldviews and value systems alter peoples' sense of place and cultural identity and lead to a breakdown in the intergenerational transmission of local knowledge, practices and languages that are so closely tied to the surrounding environment" (p. 133).

The identification of peoples and places as endangered established the basis for a platform of action (Figure 1) to address declines in global biocultural diversity based on a three-fold rationale that links ethics and social justice, human heritage, and adaptive capacity arguments (Maffi, 2001). The interest in these three areas has led to the development of four principal themes underpinning biocultural diversity; namely, (1) the relationships between biodiversity, cultural, and linguistic diversity; (2) common threats to biological, cultural and linguistic diversity and the sociocultural and environmental consequences of loss; (3) approaches for joint-maintenance and revitalisation of different aspects of biocultural diversity; and (4) "the development of *related aspects* of human rights" (Maffi, 2005, p.600, emphasis added). This program of work has resulted in a number of initiatives that have iteratively framed scholarship and action regarding biocultural diversity.

2.2.2 BIOCULTURAL DIVERSITY INITIATIVES

Maffi and Woodley (2010) provide a comprehensive survey of biocultural diversity projects. As summarized in Table 2, this work was the first to provide an overview of what distinguished biocultural diversity cases from other development approaches. These initiatives have worked to influence policy at local, national and international levels to reduce threats to, and support the conservation and sustained use of biocultural diversity.

As Maffi and Woodley (2010a, pp.179-181) have noted, many of those involved in advocating for biocultural conservation have focused on building recognition of biocultural diversity within policy, particularly through the work program of the CBD and within different initiatives from UNESCO that focus on the linkages between natural and cultural heritage. Biocultural diversity has also begun to appear in policy statements such as the Johannesburg Declaration on Sustainable Development and the Johannesburg Plan of Implementation[3] (2002) and the Millennium Declaration (UN, 2000). At the national level, biocultural diversity has been incorporated into: The Biological Diversity Act of India (NBA, 2002); The Philippines Indigenous People's Rights Act of 1997[4]; and, an act passed in the Republic of Panama.

2 http://www.globaldiversity.org.uk/
3 Formulated by the UN Department of Economic and Social Affairs, Division of Sustainable Development; available from http://www.un.org/esa/sustdev/documents/WSSD_POI_PD/English/POI_PD.htm and http://www.un.org/esa/sustdev/documents/WSSD_POI_PD/English/POIToc.htm respectively.
4 Available from http://www.wipo.int/wipolex/en/text.jsp?file_id=179605

Table 2. Key elements of biocultural diversity conservation summarised and compiled from Maffi and Woodley (2010).

Key Project Selection Criteria	Project Areas of Emphasis	Project Entry Points	Project Approaches	Conditions for Success and Target Outcomes
• Integrative and synergistic • Support intergenerational transmission of biodiversity related knowledge, practices and beliefs • Endogenous or highly participatory	• Cultural practices that contribute to biocultural diversity • Indigenous, traditional, or local knowledge • Maintain or revitalise Indigenous or local languages • Biocultural diversity oriented policy	• Biocultural diversity through cultural affirmation • Revitalising and supporting knowledge, practices, and beliefs associated with biocultural diversity • Sustaining and revitalising languages and associated biodiversity knowledge	• Encourage and sustain existing traditional knowledge and management of biodiversity • Support land claims, resource tenure, and governance systems • (Re)build nature-based beliefs and value systems • Revitalise and revive languages and aspects of language associated with biodiversity	• Strong local institutions • Land and resources tenure • Strong local identity • Reconnect elders and youth • Collaborative partnerships • Capacity building • Government support

Over the last decade, biocultural diversity has also become a prominent and explicit theme and program area for many UN Programs, NGOs and government agencies, as well as in academic research programs. Specific examples of the use of biocultural diversity in substantive projects and programmes include *inter alia*:

- UN Permanent Forum on Indigenous Issues, devoted its 7th Session in 2008 to the Theme 'Climate change, biocultural diversity and livelihoods: the stewardship role of Indigenous Peoples and new challenges,[5]
- International Institute for Environment and Development (IIED) program area, Biocultural Heritage: Protecting Interlinked Systems[6];
- IUCN used bio-cultural diversity and Indigenous Peoples as a specific theme at the 4th World Conservation Congress 2008[7]:
- CEESP bases the inter-relationship between biological and cultural diversity in all aspects of its work, and uses the term biocultural diversity in its objectives, approaches and policy papers[8];
- International Society of Ethnobiology – An Alliance for Biocultural Diversity uses the term biocultural heritage throughout their Code of Ethics[9];
- Terralingua – Unity in Biocultural Diversity[10] has been promoting linguistic dimension of biocultural diversity through many projects and programs, including the Terralingua Biocultural Diversity Education Initiative[11];
- Natural Justice – Lawyers for Communities and Environment published in 2011, *Towards a People's History of the Law: Biocultural Jurisprudence and the Nagoya Protocol on Access and Benefit Sharing* (Kabir Bavikatte and Daniel F. Robinson)[12]; and,
- Biocultural Diversity Learning Network uses the Assling Accord to articulate a set of guidelines for guardians of biocultural diversity and their allies to acquire and develop appropriate tools of research and teaching[13].

In the mid-2000s, IIED and Indigenous NGOs (ANDES, Peru and Call of the Earth/Llamado de la Tierra) began working on the concept of 'collective biocultural heritage' (Swiderska & Argumedo, 2006). They define collective biocultural heritage as: knowledge, innovations and practices of Indigenous and local communities which are collectively held and inextricably linked to traditional resources and territories, local economies, and the diversity of genes, varieties, species and ecosystems, cultural and spiritual values, and customary laws shaped within the socio-ecological context of communities (Swiderska, 2006, p.3; Argumedo *et al.*, 2011). The concept emerged in part as an attempt to offer a holistic and comprehensive approach for the protection of Indigenous knowledge. 'Collective biocultural heritage' entered the international arena as part of the UN Permanent Forum on Indigenous Issues (Swiderka & Argumedo, 2006; Mead, 2005). Biocultural heritage draws particularly on experiences and thinking that emerged through collaborative work with Quechua farmers, as well as the work of the late Dr. Darrell Posey, and the 'guidelines for the protection of Indigenous heritage' developed by Erica Daes of the UN Working Group on Indigenous Populations (Swiderska & Argumedo, 2006).

The concept of 'collective biocultural heritage' has been particularly influential in the work of IIED and Natural Justice. A focus of their activities has been establishing biocultural protocols as *sui generis* systems for protecting and using biocultural resources. The most frequently cited example of their work is related to the establishment of El Parque de las Papas (the Potato Park) in Peru as an 'Indigenous Bio-cultural Heritage Area' (Pimbert, 2007; Swiderska, 2006; Argumedo & Pimbert, 2008; Argumedo & Stenner, 2008).

2.3 ACCOMPLISHMENT AND CHALLENGES

Scholarship and action regarding biocultural diversity has made a significant contribution to creating an alternative

5 http://social.un.org/index/IndigenousPeoples/UNPFIISessions/Seventh.aspx
6 http://biocultural.iied.org/
7 http://cmsdata.iucn.org/downloads/bcd_ip_report_low_res.pdf
8 http://www.iucn.org/about/union/commissions/ceesp/ceesp_about/
9 http://ethnobiology.net/
10 http://www.terralingua.org/
11 http://www.terralingua.org/bcdeducation/
12 http://www.lead-journal.org/content/11035.pdf
13 http://www.bdln.net/node/1092

discourse for development in rural indigenous and local communities that has influenced both the policy and practice of national and international organizations. In particular, it shifted mainstream western-based conservation policy and practice by providing credible evidence of the importance of Indigenous Peoples' traditional knowledge in the preservation of the environment and biological diversity. It has also highlighted that development should be defined locally and, rather than emphasizing economic indicators, should be rooted in, and strengthen, the rights, knowledges, languages, identities, and resources of local and Indigenous Peoples. Maffi (2010, p.3) states that the proliferation of biocultural diversity conservation projects (*c.f.* Maffi & Woodley, 2010) illustrates that this is an imperative whose time has come.

Along with a focus on conservation and development, the discourse of biocultural diversity also supports the rights of Indigenous Peoples and local communities and their efforts to achieve those rights and wider goals. Initiatives related to biocultural heritage have been particularly important in establishing new mechanisms, such as community biocultural protocols, for the protection of Indigenous knowledge and resources.[14] Drawing on the growing recognition of local and Indigenous Peoples rights, as expressed in the UN Declaration on the Rights of Indigenous Peoples (UN, 2007), the CBD (Article 8j and associated Articles)[15], and other international agreements, the human rights argument for the conservation of biocultural diversity rests on the right of local and Indigenous Peoples to exist as distinct social groups.[16] Maffi (2005), for example, argues that changes in international human rights standards are promoting "a new vision in which the protection of human rights (both individual and collective) is intimately connected to the affirmation of human responsibilities toward and stewardship over humanity's heritage in nature and culture" (p.612).

In spite of these accomplishments, it is important to realize that biocultural diversity conservation is not an Indigenous concept, but rather one that has been developed by scholars interested in understanding the linkages between nature and culture. Therefore to move forward in a joint effort of celebrating biocultural diversity and heritage, the central question becomes how to effectively respond to and work with Indigenous Peoples proposals and initiatives within the larger context of conservation and development models that are western-based. Supporting and advancing the self-determination and rights of Indigenous and local people are now the guiding forces around which collaborative initiatives and alliances must be oriented and structured.

A continuing challenge for the field of biocultural diversity will be ensuring that Indigenous Peoples obtain "recognition of their rights to the resources found on their land and territories on which they depend on for their economic, spiritual, cultural, and physical well-being" (Inter-American Commission on Human Rights, 2009, para.179) and as captured by the United Nations Declaration on the Rights of Indigenous Peoples (UN, 2007) and reiterated again in the Indigenous Peoples International Declaration on Self-Determination and Sustainable Development.[17] The growing privatisation of knowledge and resources adds a new dimension to the challenges of advocating for and securing such rights. However, this is an area that has been well developed and is being moved forward by Indigenous Peoples themselves (Swiderska, 2006; Pimbert, 2007; Mead, 2005). One of the longer-term goals of Indigenous Peoples in obtaining such rights has been to gain control over their lands, territories and resources in order to ensure development proceeds according to their own values and sustains their identities. In the field of biocultural diversity, IIED, IUCN CEESP and Natural Justice have suggested that biocultural products and services developed from biocultural heritage can provide an option for self-determination and endogenous development by linking economic opportunities with valued cultural practices and associated skills. Dutfield (2011) provides a review of legal instruments to support such a process.

Cocks (2010) has also suggested that the field of biocultural diversity needs to consider how self-determination can also produce new and novel combinations of biocultural values, practices, and knowledge that can contribute to endogenous development trajectories. The challenge for rural indigenous and local communities is to engage in processes of social change and "intercultural hybridisation" on their own terms and with the power to achieve desired outcomes (*ibid.*, p.72). This will include, when desired, the time to remember, and memorialize, the trauma and loss experienced through processes of colonization and globalization. It will also require the rights and policies necessary to ensure that communities can make decisions about their territories, education, health and development.

The goals of biocultural diversity conservation and Indigenous Peoples' rights to preserve and protect their lands, territories and natural resources should allow for innovative processes and alliances founded on Indigenous Peoples' self-determination. Rural indigenous and local communities share similar goals in sustaining their biocultural heritage. One of the remaining challenges is to conceptualize the role of biocultural heritage in supporting the adaptive capacity of communities for sustainable development. A field that may offer new thinking to support such aspirations is "design thinking", which empowers the creativity of individuals and collectives to confront systemic marginalization and imagine new futures (Brown, 2009). We now turn to consider an approach for endogenous innovation that we term "biocultural design" and which builds upon the adaptive potential of biocultural heritage.

3. BIOCULTURAL DESIGN

The basic premise of biocultural design is that people are creative agents with knowledge, values and skills that allow them to shape their everyday lives (Davidson-Hunt, 2006; Davidson-Hunt & Berkes, 2003; Sen, 1999). Our goal in this section is

14 Community Protocols - http://www.community-protocols.org/
15 See http://www.cbd.int/convention/text/
16 A comprehensive overview of multilateral agency work up to 2006 related to Indigenous knowledge protection is presented by Swiderska and Argumedo (2006).
17 IWGIA: International Work Group for Indigenous Affairs – http://www.iwgia.org/news/search-news?news_id=542

to consider the creative potential of biocultural heritage as a source of innovation for sustainable development in rural indigenous and local communities. To do so, we draw inspiration from design thinkers working in the area of co-design and from the work of Sen (1999), a key thinker in human-centred approaches to development. While Sen's framework is broad, we limit our discussion to its contribution to innovation and the development of new products and services for endogenous development. We propose biocultural design to be an intentional, collective and collaborative process by which individuals with a diversity of knowledge and skill sets engage in a creative process of designing products and/or services. The goal is for communities to create and deploy solutions to contemporary challenges that reflect their desires, values and aspirations.

What follows is conceptual in nature. We do not suggest that it is a process that all communities would find useful in all situations. However, it could provide a useful starting point for those communities already engaged in pursuing self-determination and sustainable economic development. We see particular application for biocultural design in situations were communities are looking to build new economic development opportunities that both reflect cultural values and use biocultural heritage in new ways - including the development of commercial products or services. Numerous case studies and policy statements, as presented in the introduction, reflect how Indigenous Peoples, and local communities, are working on their own terms to build futures for their communities through the creation of economic opportunities. However, the process of identifying what economic opportunities are desirable and appropriate and under what terms is often a complex and difficult one. We see biocultural design as a process that may help communities engage in such conversations and create innovative ways to meet their context-specific needs and challenges.

3.1 DESIGN INFLUENCES

Design is the process by which an idea is conceived and then given form, structure and function. Design is also a practice of inquiry and action that includes both creativity in the conception of new ideas and innovation in making such ideas visible in everyday life (Buchanan, 2001). The field of design has been dominated by physical design, such as architectural or interior design, engineering design, graphic design, urban design, information systems design, software design and fashion design. However, the approach can also be applied to the design of organizations, institutions and social systems (Nelson & Stolterman, 2002) as well as rural regions (Thorback, 2012).

When design professions emerged during the 20th century, they tended to assume a linear and knowable world whose problems could be solved through scientific knowledge applied by professionals. In the 1980s, a general crisis in confidence in expert knowledge and the resultant demand for citizen involvement in the design and implementation of solutions to problems facing society began to shape design. Nelson and Stolterman (2002) proposed that the relationship between designers and clients should be one that is balanced but also one in which there is creative tension. In this approach, the emphasis is not on an individual designer, as is common in design fields like fashion, but on the composition of a design team that brings their collective knowledge, values and skills to bear on a particular design challenge, or 'brief'[18], through a creative process of collaboration that leads to an innovation (e.g. physical product, technology, institutional arrangement, organizational procedure) as indicated by the design brief. Design aims to create a particular, working solution using available capital (financial, social, ecological, human) and time.

Brown (2009) proposes that design is the outcome of a process of divergent thinking that considers the full range of relevant ideas related to the brief and then progressively refines them through convergent thinking. This moves through phases of "inspiration, the problem or opportunity that motivates the search for solutions; ideation, the process of generating, developing and testing ideas; and, implementation, the path that leads from the project room to the market" (p.16). Brown (*ibid.*, p.18) suggests that this process occurs through successive loops of these phases and is refined through attention to the constraints of desirability, feasibility and viability. He defines desirability as "what makes sense to people and for people", feasibility as "what is functionally possible within the foreseeable future", and viability as "what is likely to become part of a sustainable business model." As Nelson and Stolterman (2002) suggest, design is a process that results in a 'composition'. A composition "pulls a variety of elements into relationship with one another, forming a functional assembly that can serve the purposes, and intentions, of diverse populations of human beings" (p.22). The working solutions that result from the design process are not conceived of as ultimate, permanent solutions. Rather they are recognized as the best solution the design team could produce for the here and now, which will need to be reassessed, revised and redesigned according to changing variables underlying the design challenge, triggering new processes of inspiration, ideation and implementation.

Nelson and Stolterman (2002) and Brown (2009) are clear that design is a way of being and doing that brings together networks of materials and people into an intentional exercise of creative agency to respond to the changing environments that generate design challenges. Design practice, however, has overwhelmingly concentrated on generating incremental change in the aesthetic of consumer goods for high consumption markets as a component of a tight chain of design, production, marketing and consumption (Melles *et al.*, 2011). The ethical implications of design, Oosterlaken (2009) admonishes, have long been sidelined within the culture of design practice. In the face of mounting global environmental and social concerns, a growing number of voices are calling for a shift in the culture of design from 'designing for the market' to 'design-

18 A design brief is a concise document establishing the aim and boundaries of a design project (Brown, 2009).

ing for society' (Margolin, 2007; Oosterlaken, 2009; Thomas, 2006). Some new thinking in design has invoked Sen (1999) to consider how design is not just about producing solutions but about enhancing the capabilities and functionings of people within diverse societies through a process of co-design (Melles *et al*., 2011; Oosterlaken, 2009).

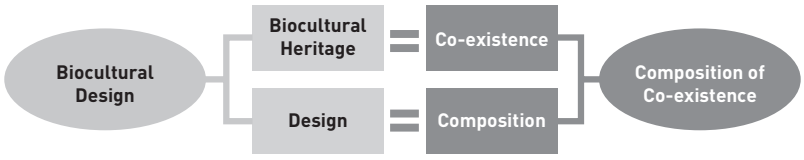

Figure 2. Bringing the field of biocultural diversity together with the practice of design.

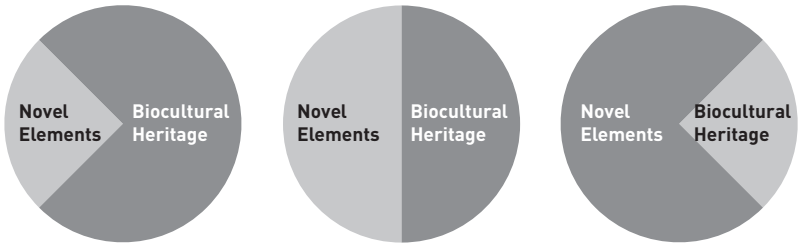

Figure 3. Biocultural designs results in compositions of co-existence that include varying proportional contributions of novel and biocultural heritage elements to generate innovation.

3.2 BORROWING FROM SEN – CAPABILITIES, FUNCTIONINGS AND AGENCIES

A key insight from Sen's writings on human-centred development is that improvements in life chances and quality of life should be recognized and prioritized both as the aim and as a necessary means of development. Sen (1999) defines development as, "a process of expanding the real freedoms that people enjoy" (p.3) and states that real freedom occurs through a process of enhancing the positive freedoms, or capabilities, of people to "lead the kind of lives they have reason to value" (p.10)[19]. A set of capabilities expresses the range of substantive freedoms, or life of opportunities, held by an individual.

Essential to the capability approach to development is the recognition that individuals, families and communities are embedded in contexts constituted by social and material relationships (Alkire & Deneulin, 2009; Oosterlaken, 2011). A capability approach thereby expressly "draws attention to the existence of immense human diversity" (Oosterlaken, 2009, p.98). For this reason, Sen does not propose a definitive set of capabilities (Oosterlaken, 2009). Rather, he suggests domains of instrumental freedom – political freedoms, economic facilities, social opportunities, transparency guarantees, and, protective security – that are essential to creating capability-rich societies. In other work, Sen (1998; 2000; 2004) addresses the role of culture in informing capabilities. He argues that values, knowledge, and practices associated with cultural traditions are instrumental, evaluative and constitutive assets that inform capabilities and functionings. Within a capability approach, capabilities (*that which you could be being and doing*) are distinct from functionings (*that which you are being and doing in practice*). Capabilities denote the full range of possibilities an individual holds, while functionings are the actual life choices made by that individual – for example, working, resting, being literate, being healthy, being able to travel, and being confident (Oosterlaken, 2009; Sen, 1999). As functionings unfold, new ranges of capabilities come into view.

Oosterlaken (2009) is one of the first scholars to explicitly bring Sen's capability approach into the field of design. Central to both design and the capability approach is the idea of an individual as starting point, seen as culturally endowed beings who act and create as part of complex social networks. A capabilities approach suggests that all humans have capabilities that become functionings through an exercise of their agency guided by cultural values. Capabilities are things, such as resources, assets or capitals that are culturally and socially constructed. For example, if a person does not perceive the utility of a thing, or believes it is taboo to use a thing, then it does not fall into the set of possible resources, assets or capitals of which they can make use. While Oosterlaken (*ibid.*) suggests that the role of design is to increase the set of capabilities available to human agents, Sen's work has noted that it is in the exercise of agency, in a specific time and place, in order to achieve a particular functioning, that individuals and societies change the set of capabilities available to them for future action. This is essential to Sen's proposal, as the exercise of agency is decisive in determining one's activities and thereby the building of one's own capabilities and subsequent agency.

To be consistent with a capability approach, the goal of design would be to support people as they draw upon their capabilities and undertake actions to achieve specific functionings.

3.3 BIOCULTURAL DESIGNING – CRAFTING COMPOSITIONS OF CO-EXISTENCE

Central to recent conceptual framings of biocultural diversity is that ways of being and doing should allow for our co-existence with 'the other', who may be human or another living or spiritual being, while building upon and enhancing diversity. The concept of biocultural heritage clearly moves away from biocultural diversity as an index and shifts the focus to the materials of biological diversity interacting with the knowledge, practices and values of a society as they craft sustainable livelihoods. In Figure 2, we provide a graphic to focus attention on biocultural design as an intentional process of creating compositions of coexistence through the use and guidance of biocultural heritage. In design, composition is a central concept that captures the process and outcome of bringing together

19 Nussbaum has also contributed to development of the capabilities approach to development (Coecklbergh, 2011). Her work, however, is distinguished from Sen's by a greater focus on skills and personality traits (Oosterlaken, 2009).

available elements in such a way that they produce a functional assembly, be it a product, service or other innovation. In other words, while design brings to the biocultural heritage framework a focus on innovation, the design process itself is given a new set of materials to work with in creating solutions that foster co-existence through a collaborative process with local peoples. The goal is to provide an approach to innovation that is rooted in biocultural heritage and to provide support to local peoples as they face livelihood challenges.

In creating compositions of co-existence through a collaborative design process, people will draw upon their biocultural heritage and have the opportunity to learn about novel ideas and technologies from other participants. In Figure 3 we suggest that each challenge and design brief will draw upon biocultural heritage and non-endogenous, novel elements to varying degrees. What is required to respond to any given challenge and the ongoing need to co-exist with others requires a process of constructive dialogue in order to generate innovations, in the form of products or services, which reflect the contemporary needs, values and aspirations of a group of people.

3.3.1 BIOCULTURAL DESIGNING

Biocultural designing is a multi-party process of inspiration, ideation and implementation (Figure 4). It begins with the formulation of a design brief and bringing together a design team (see Section 3.3.2). While the design team is responsible for leading the process, it does so by working with potential producers/providers of a product or service and the potential consumers. As Brown (2009, pp.177-178) suggests, design has begun to reflect a new and participatory social contract in which people expect to participate in a two-way conversation with product or service providers and to interact with the provider beyond the initial transaction. The line between product and service is also increasingly blurred. People have moved from simply demanding functional performance from products and services to demanding satisfying experience during their use of them. The outcome of a design process thus facilitates the being and doing of individuals who are part of complex systems and networks made up of materials, producers and consumers bound together through social relations and exchanges. Such networks will utilize their capabilities to create innovative compositions of co-existence and, through an iterative process, create products or services that enhance their ways of being and doing (capabilities). As with much design practice, a product or service is the functional outcome; however, equally important in biocultural designing is that the people most affected are active participants in the creation of products and services that can positively contribute to their livelihoods.

Members of a design team, producers and consumers are all part of a network of beneficiaries associated with the design process. We use the term 'beneficiaries' rather than alternatives such as 'stakeholders' in order to emphasis the orientation of biocultural design towards the generation of change, or innovation, that is deemed positive by those most effected. Similar to the design team members, the producers/providers and consumers will be involved in a process of creating compositions of co-existence that result in a specific functioning that they will produce/provide or consume. However, their involvement will not end with the creation of a product or service, but will continue as it becomes part of their experience of the world through new ways of being and doing as well as through enhanced capabilities that open up new opportunities.

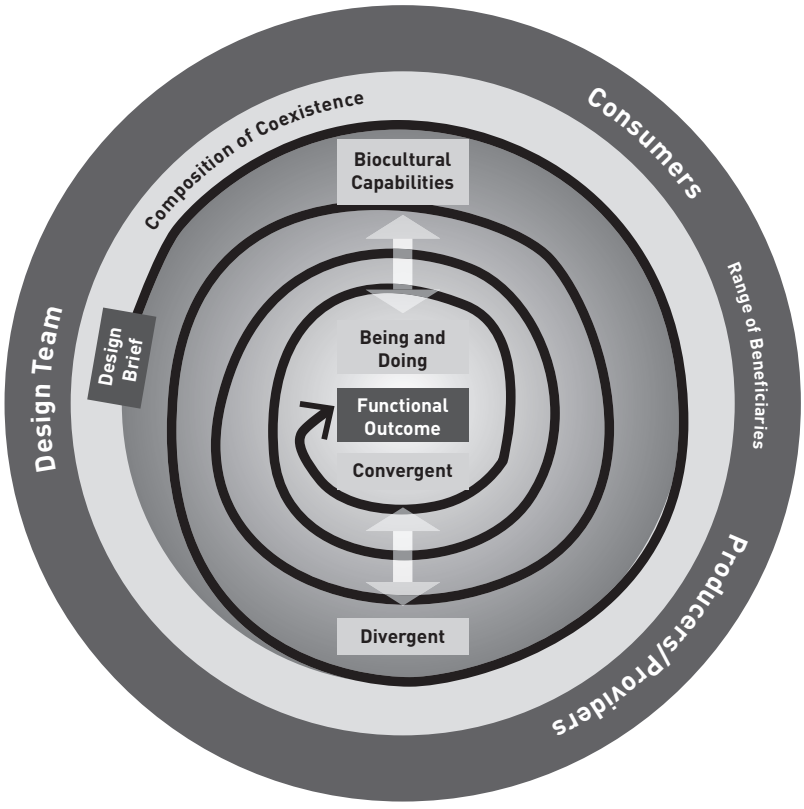

Figure 4. Biocultural design process.

At the start of a design process, divergent thinking is utilised to consider the full range of biocultural heritage as a set of capabilities that provides elements to create compositions (Brown, 2009, p.14). At this point, the focus is on thinking broadly to allow innovative compositions to emerge, quickly followed by conversations with producers/providers and consumers. Such conversations will reveal gaps in the team's knowledge regarding biocultural capabilities and other perspectives on compositions created by the team. As suggested in Figure 4 this iterative sequence is repeated to deepen the knowl-

edge of biocultural capabilities essential to the design process and to create compositions in the form of potential products or services through the creative input and perspectives of the whole network of beneficiaries.

As the process proceeds, thinking will become increasingly convergent as prototypes of products and services are developed and evaluated by the network of beneficiaries and through the lenses of viability, feasibility and desirability. Through this process of convergent thinking, the process will move from the set of biocultural capabilities to a narrower focus on the products or services that enhance a particular, desired functioning. The cycle ends with the creation and operationalization of a functional outcome (product or service) generated through the biocultural design process. This outcome reflects the specific product or service output of the process as well as the integration of that output in the everyday life of producers and consumers.

3.3.2 BIOCULTURAL DESIGN TEAM COMPOSITION

Critical to biocultural designing is the formation of a biocultural design team. Such teams create networks of people who hold relevant knowledge for the particular design challenge and are similar to concepts such as place-based learning and communities of practice (Davidson-Hunt & O'Flaherty, 2007; Robson *et al*., 2009; Wenger *et al*., 2002). As with any team, a leader is needed, but in biocultural design it is important to establish a co-leadership arrangement between, for example, a community enterprise/organization and the design firm contracted by the enterprise/organization.

One of the advantages of design is that a plurality of knowledge enhances the creative process of the team and people with diverse skills can be included from a wide range of knowledge traditions. A botanist from a university and a plant harvester from the community are equally valid as team members and will enrich the capabilities set of the design process. Biocultural design teams should reflect the network of beneficiaries and, similar to the partnership of team leaders, should bring biocultural heritage together with novel elements to generate innovation. Each participant brings capabilities, agency and values to the biocultural design process. The success of a biocultural designer will rest on their ability to create the partnerships and networks necessary to create compositions of co-existence that can lead to particular products or services that meet a group's aspirations for ways of being and doing both now and in the future.

3.3.3 GUIDING COORDINATES FOR BIOCULTURAL DESIGNING

Designing is more akin to wayfinding through unknown territory than it is to following a previously made path. Reflecting upon ways in which design can be used, Melles *et al.* (2011) propose that ethics should guide practice. Similarly, the practice of biocultural designing also requires guiding coordinates to help those involved find their way, comparable to how stars help chart direction when terrain does not provide fixed reference points.

In Table 3 we provide a list of examples of guiding coordinates that we believe are central and distinguishing features of biocultural design. Communities undertaking biocultural design

Table 3. Guiding Coordinates of Biocultural Design

Design Team Composition:
Does it provide balance between knowledgeable community members and complimentary expertise?

Participation:
How will community members / users of product or service be involved in the design process?

Design Team Operational Principles:
Have roles and responsibilities held by members of the design team been defined, and do the team's operational principles consider self-reflexivity, equity, respect and compromise, as part of strengthening the foundations of collaborative design?

Political and Institutional Support:
Do political leaders and relevant institutional actors support the biocultural design approach, and has the need for checks and balances been incorporated into protocols and agreements (where applicable)?

Cultural Identity:
Is the design process guided by local cultural values / traditions / identity?
How will the design process be sensitive to language (including technical jargon) and allow linguistic difference to guide the process?

Local Materials:
How will local resources / capacities contribute to the design process?

Foundation and Building Blocks:
Is there a clear understanding of the existing capabilities, capitals and rights amongst the design team, and their links to local institutions as well as their ability to be sustained over the long-term?

Principle of Seven Generations:
Has the distribution of benefits, harms and responsibilities been considered over the long term, through the lenses of desirability, feasibility and viability?

Subsidiarity Principle:
Has the role that can be played by community organizations (enterprises, institutions) been considered, including reflection on any aims and objectives related to self-determination?

Network of Beneficiaries:
Has the distributional effects of networks of beneficiaries (value chains) been assessed over time, including the role of (potential) partners?

Cultures of Innovation:
Does the design process lead to a culture of innovation that builds upon itself over time?

processes may find our list relevant, but may also choose to modify and refine it to reflect their context and perspectives. While we have provided a preliminary sketch of the terrain that could provide a new approach for sustainable development rooted in identity, values, territories and biodiversity, the details can only be filled in through practice and specific projects. Rather than create a rigid guidebook, we feel it is best at this point in time to simply point out new directions and signposts that will facilitate creative processes of intentional and collaborative problem solving relevant to one's own journey through challenging and dynamic environments.

What is important to note about such coordinates is that they are there to be drawn upon, but their salience, or visibility, may change depending upon one's location in a design journey. Some may be of vital importance during one stage, fade away for a while, but then come back at a later point. Furthermore, one's position in relation to a guiding coordinate changes throughout the journey and may influence choices made over the course of that journey in different ways at different times. Such coordinates do not provide answers but rather act as queries to be considered and reflected upon as a design team works its way toward particular products or services that meet the aspiration of the network of beneficiaries.

4. CONCLUSIONS – FROM BIOCULTURAL DIVERSITY TO BIOCULTURAL DESIGN

Indigenous and local peoples face pressures from many quarters. Often these pressures are contradictory and generate persistent tensions within communities. For example, demands for employment and economic opportunity generation are sometimes found to be at odds with the conservation of biocultural heritage. For this reason, many Indigenous and local peoples are advocating for and actualizing processes of endogenous development that squarely centre attention on the terms by which tensions are negotiated and innovative solutions are pursued (*c.f.* Berkes & Davidson-Hunt, 2007; Davidson-Hunt & Turner, 2012; Davidson-Hunt & Berkes, 2010). In this paper, we have introduced the idea of biocultural design as an approach to innovation that can support the endogenous development efforts of rural indigenous and local communities. Through intentional engagement in processes of design related to a particular need or problem, biocultural design teams can work to bring together biocultural heritage and novel or exogenous elements to create innovative products or services that reflect the needs, values and aspirations of communities. In doing so, biocultural design can support the creation and enactment of new compositions of co-existence that work to extend the real freedoms of individuals and groups of people.

Biocultural design draws upon the work undertaken to build awareness about biocultural diversity and efforts to position biocultural heritage as an important component for endogenous approaches to development. Much of this work has been undertaken by individuals and institutions associated with CEESP/IUCN. The use of biocultural diversity as an index has made a notable impact within a relatively short time. It has influenced international, national and local discourses, policies and practices by raising the profile of Indigenous and local peoples significant contributions to the creation, preservation and perpetuation of the rich diversity of life on Earth. Biocultural heritage has recognized and supported the rights of rural indigenous Peoples and local communities to control their own heritage as a means to achieve sustainable livelihoods and self-determination. In taking that next step, biocultural design offers an approach to support innovation within the framing of biocultural heritage and the means to include a plurality of knowledges as IUCN seeks nature-based solutions to global challenges in the years to come.

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