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# Shared Understandings: Environmental perspectives of Kenyan community members and teachers

Cassie Quigley  
*Clemson University*, [cassieq@clemson.edu](mailto:cassieq@clemson.edu)

James Dogbey  
*Clemson University*

S Megan Che  
*Clemson University*

Jeffrey Hallo  
*Clemson University*

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# **Shared Understandings: Environmental perspectives of Kenyan community members and teachers**

## **Abstract:**

Environmental issues are a shared human concern as communities in all nations and geographic regions are grappling with environmental degradation. Despite this concern, there are multiple different viewpoints on the current state of environmental issues and how to understand these problems. Understanding how different communities conceive of the environment and sustainability is paramount in efforts to increase the frequency of environmentally conscious choices. If an awareness of others' perspectives of the environment are lacking, then the development of sustainable choices is placed at risk because of potentially competing views of what sustainability means in a particular context (Van Bueren, Klijn, and Koppenjan 2003). As such, solutions to these environmental problems are frequently viewed as “wicked problems.” This study investigates the shared and divergent environmental viewpoints of teachers and community members in Kenya. This study utilized photo-methodologies and qualitative in vivo analysis. The shared viewpoints were on positive and negative notions of environmental issues. The divergent viewpoints were on solutions that included types of innovations and amount of government involvement.

**Keywords:** environmental perspective, photo-methodology, divergent viewpoint, shared viewpoint

## **Introduction**

Environmental issues are a shared human concern as communities in all nations and geographic regions are grappling with environmental degradation. Despite this concern, there are multiple viewpoints on the current state of environmental issues and how to understand these problems. Understanding how different communities conceive of the environment and sustainability is paramount in efforts to increase the frequency of environmentally conscious choices, a goal of environmental education (UNESCO-UNEP., 1976). If an awareness of others' perspectives of the environment are lacking, then the development of sustainable choices is placed at risk because of potentially competing views of what sustainability means in a particular context. Kenya offers a unique setting because of its complex environmental issues. This project engaged community members in an economically and environmentally fragile region—the Narok district in Kenya. Narok District includes the Mau Forest and the Maasai Mara National Reserve, which provide both ecological and monetary benefits to the country. However, this area faces the challenges of destructive environmental practices such as deforestation, insufficient waste management, and water pollution. Such practices have contributed to drought and adversity in the surrounding valleys. The Mara River, the only perennial river in the transboundary ecosystem, is often the only source of water for grazing animals during the dry season. Increasing water demands from agriculture, industries, and growing human populations reduce its availability for migratory species. For example, during the temporary 1993 drought, nearly 400,000 wildebeest and innumerable other species died due to water shortages in the river. Even late arrival of seasonal rains causes huge devastation to the area. In 2006, the delayed rains caused widespread drought in the area, which disrupted the annual migration of the wildebeest,

destroyed crucial watersheds, and disrupted livelihood for the Maasai, the primary indigenous group in the area.

In the Mau forest and Maasai Mara National Reserve (Mara, henceforth), more than one million acres of forest have been cleared for land development and fuel. This deforestation has destroyed crucial watersheds, ecosystems, and wildlife as well as sacred lands of the Maasai people. The Maasai people utilized the Mara for grazing for their cattle and other livestock. Cattle are extremely important to the Maasai communities as it signifies wealth and status. The government attempted to protect the Mara by limiting the land that pastoral communities such as the Maasai people can utilize for animal grazing to outside the Mara. However, these land adjudication practices did not attend to the indigenous ways of pastoral living of the Maasai.<sup>1</sup> By displacing the pastoral communities outside of the Mara, the government created distrust and disengagement towards environmental sustainability and sustainability education (Davis, 1993). For these reasons, it was important to re-engage the local communities by developing an interdisciplinary, integrative approach that positions the stakeholders as central to understand how progress can be made towards environmental sustainability. As such, environmental problems, such as the ones currently facing Kenya, are frequently viewed as *wicked problems*.

Churchman (1967) first coined the term wicked problems to describe complex, unique, ill-defined issues that are wrought with political divergence, ideological differences, and scientific uncertainty. The use of the word *wicked* does not mean evil but rather refers to the resistance of resolution. Rittel and Webber (1973) formulated 10 characteristics of wicked problems, which include the lack of a definitive formulation of the problem, a lack of truth or falsity, the existence of a uniquely context-dependent situation, and the existence of another

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<sup>1</sup> For more information on these land adjudication practices, see (Anderson, 2005).

problem of which the original problem is a symptom. In other words, they are inherently resistant to an agreed-upon and clear solution. Conklin (2006) expanded on Rittel and Webber's notion of wicked problems by adding in the notion of social complexity. Social complexity, according to Conklin, is the number of diverse players involved in the project or issue. The greater the number of people involved or the variety of diversity, the more complex the situation is. He defined *fragmentation* as wickedness with social complexity. He asserts that fragmentation suggests a condition in which pieces (perspectives, understandings, or intentions) are scattered or chaotic. Sometimes the fragmentation is obvious but other times it is hidden until stakeholders begin trying to change the fragmented condition. At this point, the stakeholders realize that those who are involved in the creating/influencing/affecting the complex situation do not share their understandings.

Wicked problems are an important topic within environmental education and sciences research circles, and for good reason. As early as 1967, scholars and practitioners from a variety of disciplines recognized the political, economic, and ideological complexity that many environmental problems presented. The intersection of between politics, economics, science, and social issues confounds global issues such as environmental ones because they lack clear definitions, boundaries, and solutions (Churchman 1967). More recently, institutions have tried to work across agencies, organizations, and communities to build wicked-problem-solving capacity (Roberts 2002). Unfortunately, this research has stagnated in the communities where the environmental issues occur (Weber and Khademian 2008) because the social complexity is not addressed. Often the problems are "solved" by those outside to the local issues, which do not address the diversity of perspectives, understandings, or intentions of the community. However, most researchers agree that wicked problems contain multiple ethical positions, viewpoints, and

knowledge systems, which are foundational to open transdisciplinary inquiry (Brown, Harris and Russell 2010). Brown (2010) considers the first step of open transdisciplinary inquiry is to understand the multiple views that inform knowledge construction and make these positions transparent. Thus, the purpose of this study was to involve the community in meaningful conversations about local issues. During these conversations, the goal was to create a space for dialogue to occur and to identify both shared understandings of and divergent thinking about context-dependent environmental issues.

The direction of this study was guided by the theory of using non-traditional approaches towards unpacking wicked problems. One such approach is to utilize a collaborative strategy, which aims to engage all stakeholders in order to find the best possible solution for all stakeholders. Typically these approaches involve conversations in which issues and ideas are discussed and a common, agreed-upon approach is formulated. This approach is related to the idea that in order to address environmental challenges, social change is needed, which requires an understanding of social learning. The social learning approach is a relatively new approach to environmental education and has been used to support collective action and understanding of human-environment interactions. It is a useful approach in environmental education, particularly when the focus is on actively engaging multiple voices rather than teaching concepts (Krasny and Lee 2002; Reed et al. 2010; Wals 2007). According to Ison, Roling and Drennan (2007) when the community is engaged in social learning, they become experts instead of recipients of information from experts and learn to apply concepts to their own situation. Social learning is collaborative and collective, as stakeholders inquire by probing discussing, and testing various insights and solutions to environmental issues (Krasny and Lee, 2002). In this study, we utilized

a social learning approach where participants shared their experiences, perspectives, and intentions during conversations about environmental issues.

In this study, the first step in this collaborative approach was to create mutual understandings of environmental issues through shared experiences among Kenyan teachers and community members. In this case, the shared experience for the participants included photo-documentation of their views of the environment. This photo-documentation occurred over several months and then follow-up focus-group vignette interviews occurred using the photographs the participants had collected as prompts for the vignettes.

It is worth underscoring that the wicked problem is a Western construct that here is being employed in a non-Western context. The authors acknowledge that wickedness concerns the prioritization of the relative dimensions of sustainability (in its simplest formulation: economic, social, and environmental). Furthermore, there is the additional wickedness, which accrues from the very many worldviews represented in Kenyan society—including traditional and indigenous perspectives—and the variety of cultures present in the Kenyan society. It is for these reasons that the authors utilized a collaborative approach to understanding the participants' perspectives. Moreover, the authors came to this approach because of previous conversations and projects (Authors et al. 2014a and 2014b) with the participants and were interested in exploring how they could come to shared understandings of environmental issues.

### **Divergent and Shared Points of View**

During this study, we sought to create a collaborative approach to establish a space for shared understandings among the participants. Undoubtedly, we understand there were reasons for opposing viewpoints. Thus, we chose to frame our study by drawing on theories that describe both divergent and shared understandings. First, we posit that there are many divergent views of

environmental issues. While there are varying degrees of divergent views, there are also viewpoints that are irreconcilable. These incommensurable views often result from escalating opposition, referred to by anthropologists as schismogenesis (Bateson 1935). During this escalation, one side of the argument makes a statement to the opposition and the opposition responds with an argument that builds upwards and is more divergent from the original argument. Bateson (1935) developed this notion of schismogenesis, and describes it as mirroring interactions, where every move by each side makes the other respond more negatively. For example, if two people are in a disagreement about the causes of changes in climate, one side might make a statement that current climate changes are human induced. The other side might say the causes are historical changes in climate and that these changes have always and will always occur. The opposition might then state the changes are coming closer together and are more erratic. The other side could respond that Ice Age also was erratic. And so the debate continues, with neither side willing to find an area of agreement or shared understanding.

We utilized schismogenesis to provide a conceptual framework for understanding the perspectives of Kenyan teachers and community members' environmental perspectives. Bateson utilized this framework with other cultures (e.g., New Guinea) (1935) and in doing so he considered the schismogenic process to be progressive and continuous. For example, there has to be a moment that prevents the schismogenic unit (a person or a group) from destroying itself through excessive disagreement. A kind of discomfort might develop that would make normal social functioning increasingly difficult. In this respect, something must exist to stop the progression before it reaches this state.

Bateson's answer was that there are two types of schismogenesis. It is either complementary or symmetrical. These types constrain each other but also maintain balance. In

complementary schismogenesis, two opposite types of behavior reinforce each other in opposite directions. Complementary schismogenesis is characterized by progression, where the dominant individual becomes more assertive, while the submissive individuals become more submissive to the point that the relationship breaks down. In symmetrical schismogenesis, the same behavior will lead to more of the “same” by the other individual or group—a repetitive system of escalating competition. Symmetrical relationships are those in which the two parties are equals or competitors, such as in sports, party politics, or wars. Complementary relationships feature an unequal balance, such as dominance-submission or exhibitionism-spectatorship. Both types of schismogenesis can easily lead to extremes and be established as pathological states. This notion of schismogenesis is critical to understanding communities’ environmental perspectives because as we examine how to make progress on these environmental issues that plague our communities, understanding the relationships that prevent opposing viewpoints from finding a common group is vital. Although Bateson does not discuss a third notion, the authors acknowledge that if the schism is not excessive it is possible to engender a tension that can lead to a new level of understanding of another’s perspective, although not necessarily an agreement.

In complementary schismogenesis, whenever opposites emphasize their different values there is an increase in shared differentiation. When different values are present there is also a greater risk for intractability (Brummans et al. 2008). Symmetrical schismogenesis differs only in that the values that are stressed are the same and not contested (Bateson 1958). Although symmetrical schismogenesis can maintain the balance of the system, there still can be increasing hostility between the groups during complementary schismogenesis. If this hostility continues, it would not be long before the relationship deteriorated into mutual hostility. Consequently, something must happen to reverse the schismogenic spiral. Bateson offered four possibilities.

First, there could be symmetrical moments that may interrupt complementary schismogenesis. For example, if there is complementary schismogenesis surrounding the issue of recycling. Each side insists upon its views to the point the groups are on the verge of not being able to communicate. However, before the situation deteriorates to this point, the side against recycling participates in an act of symmetrical behavior such as participating in a battery-recycling day at work. This action may ease the schismogenic strain. Second, the meaning of the complementary opposition may change, becoming no less complementary, but retaining a different symbolic meaning making it more tolerable. To relate it to environmental perspectives, if one group does not believe that recycling is actually beneficial to the environment, but their city offers a free recycling program and begins charging by weight for their landfill refuse, the participant might begin participating in the city's recycling program, which makes the schismogenesis more tolerable. Third, an individual may be uncomfortable with the strain of the complementary schism, which could encourage him to assume behavior intentionally in opposition with the behavior that maintains the schismogenic relationship. For example, although the individual might not agree with the opposition's views of recycling, the tone of the opposition becomes so uncomfortable that the individual tones down their opposition create a more comfortable space for the schism. Finally, persons or groups opposed to each other in a progressive complementary relationship may overcome their opposition by uniting in combined opposition to a third party or group. For example, two groups who are normally opposed on an energy-related issue (e.g., one side being in favor of renewable sources such as wind and solar and the other side being in favor of nuclear energy) might join sides to fight against the coal-burning industry. This establishes an schismogenesis between lower-carbon emission energy groups and the coal industry. In this way, the two original groups still maintain the schism but

lessen it in order to go against a side they both oppose. These four possibilities provide pathways for schisms to continue but also maintain the balance in the system so as not to destroy the system itself.

In addition to understanding divergent views, there are theories that analyze the ways symmetrical groups think and act, in other words how people who have a shared point of view act on those views. Tuomela (2007) asserts that understanding a group's point of view is important for understanding behavior. Collective group thinking and acting is important as it relates to environmental perspectives because if we can understand how people come to think about environmental issues, perhaps we can encourage groups to act collectively to make more sustainable choices.

Tuomela calls a group's viewpoint the *we-perspective* or the *we-mode*, which incorporates a group's ethos, collective commitment, affective elements, and actions based on these components. This concept includes the rich notions of *we* and *group* as well as *we-mode reasons* (e.g., "I am doing X because our group is doing Y, and doing Y requires that X be done") and *we-mode thoughts*. (e.g., "we will conduct a joint action of X together"). Tuomela clarifies that the we-perspective may be involved in one's functioning as a group member for the group and in one's functioning as a private person in a group context. In this theory, when a group acts, its members must act as group members. There is not an extra agent over and above the group members. Tuomela describes the action as *we-mode activity*.

In this way, groups are viewed as agents capable of acting as units. This is called *collectivity condition* (Tuomela 2007) and is the central constitutive element of the we-mode. Under the collectivity condition, the goal is satisfied for a member if and only if it is satisfied for all other members. Thus, individuals think and act fully as group members and are collectively

committed to the group. Collective commitment involves the group members being “socially” committed (that is, directly committed to other group members) to one another in order to act as a group. Collective commitment has two basic, intertwined roles. First, it “glues” the members together around an ethos. This gives the foundation for the unity and identity of the group. Secondly, collective commitment serves to give joint authority to the group members to pursue ethos-related action. Understandably, collective commitment and collective action can be connected around a shared ethos. However commitment and action can still be analytically kept apart as the *we*-perspective and *we*-mode. To think or act in the *we*-mode is to think or act as a group member in a full sense, thus for a group reason. In contrast, to think or act in the *I-mode* is to think or act as a private person—even if a group reason might contingently be at play.

There are many types of collective actions, such as jointly writing a paper, carrying a piece of furniture, or performing a dance. We can collectively conserve energy, vote in elections, and follow norms. However, the joint intentions are different for different kinds of collective activities. Depending on the context, different kinds of collective intentions are needed to account for different collective activities. Collective social action must rely on joint intentions in the *we*-mode, which entails that the participants must have collectively accepted (in a weaker or stronger sense) the joint intentions in question and must be collectively committed to them.

There are varying degrees of collectivity. The weakest form of collective intention is performing separate actions for the same reason. For example, citizens may have the same intention of keeping the local park clean but their actions are different. In this case, there is no intention of acting together, even if there is mutual knowledge about others having the same intention. A full-blown intention is the strongest kind of collective intention. In this case, each agent *we-intends* to complete the same action jointly with the others in the group. For example,

citizens have the intention of keeping the park clean and they clean it up together. A *we-intention* amounts to one's intention to realize one's part of the joint action. The intention to implement one's part is an *action-intention*, but one with a holistic content involving joint action. This is a personal rather than private intention based on the joint intention.

There are several paths to collective intentions and goals. One element is the collective condition for the fulfillment of collective goals previously mentioned. Full collective intentions are intentions in the we-mode as contrasted with plain individual intentions, or I-mode intentions. I-mode perspective involves the idea of thinking and acting as a private person for a reason that is private does not involve collective intentionality. There are three possibilities for intending in the I-mode: (1) The person functions solely as a private person. (2) The person is a member of an I-mode group, a collective in a broad sense in which the participants are only privately committed to the group. (3) The person is a member of a we-mode group. However, this person only functions as a group member in a weak, I-mode sense rather than in the we-mode sense.

The notion of the social group is central to the analysis of this study. Thus, we describe both we-mode and I-mode social groups with an emphasis on we-mode social groups. In social groups there is voluntary and involuntary membership. Voluntary membership involves members who endorse basic goals, values, norms, and beliefs: the ethos of the group. In voluntary membership, a member cannot be coerced to join or stay in the group. Conversely, in involuntary membership, one is typically born into a society, nation, or state. In these instances, one did not make the voluntary choice to join the group. However, it is important to note that involuntary membership can include voluntary exit from the group. For instance, one can choose to leave the involuntary membership of the state to which they are born. For this paper, we

focused on voluntary membership of groups. We acknowledge that the participants in our study are members of multiple groups—ethnic groups, political groups, occupational groups, religious groups, etc. However, we are interested in the ways in which their we-modes were or were not demonstrated during the vignette interviews.

## **Methods**

We employed a qualitative methodological approach employing utilizing in vivo coding analysis (Glasser and Strauss 1967) in order to understand environmental perspectives. The data source included focus group vignette interviews. The vignettes were created using photographs and explanations of the photographs that the participants collected and emailed to the authors. Scholars from a wide range of disciplines use vignette interviews to explore diverse social issues and problems. Additionally, the literature clearly demonstrates that vignettes capture meanings, beliefs, judgments, and actions that are locally positioned (Barter and Renolds 2000). For this project, it was important to employ an approach, such as vignette interviews, that incorporated the local geographical context (in this case, the Mau forest and the Maasai Mara). Authors 1-4 are all university professors in the United States at a mid-size university. Authors 1, 3 and 4 are US-born and identify as Caucasian. Author 2 is African, born in Ghana. Authors 1, 2, and 3 are faculty in Teacher Education. Author 4 is a faculty member in Parks, Recreation and Tourism Management.

## ***Participants***

We selected and recruited a purposeful and intentional selection of participants from the following constituents to participate in the vignette creation (taking the photographs and emailing the images and descriptions to Author 1): Maasai community members (n=4), teachers

from Mata Day School<sup>2</sup> (n=11), teachers from Kwaeki Primary school (n=10), faculty from Suswa Teachers Training College (n=7), teachers from Tamoo Day School near the Maasai Mara National Preserve (n=2), and teachers from the Community School at the Maasai Mara National Preserve (n=5). The researchers employed a purposeful selection (Schatzman and Strauss 1973) based on the following parameters: all participants were teachers in the representative school types (public, private, boarding, day school) in the Narok/Maasai Mara region of Kenya in order to get a variety of perspectives on the environment. We recognize that different schools does not always equate to different perspectives. However by recruiting from different locations and across cultural/ethnic groups, educational background, and teaching experiences, we tried to obtain participants from a variety of life experiences, The researchers also purposefully tried to balance the gender makeup of the participants; however, because teaching is a primarily female occupation in Kenya, we were unable to reach this goal. In order to follow recommended cultural practices, the headmaster or principal was included from each of the sites. The total number of participants for the vignette creation was 39, consisting of 23 females and 16 males. However, for the focus group vignette interviews, there were a total of 55 participants (30 females and 25 males), including an additional nine participants from Mata Day School, five from the Suswa Teachers Training College, two from Kwaeki Primary School, and one from the Community School. One participant from the Community School who helped with the vignette creation could not attend due to graduate school requirements. The Mata Day School is a coeducational primary school on the campus of Kenya University. The Kwaeki Primary School is a coeducational elementary boarding school in the city of Narok. Suswa Teachers Training College trains pre-service teachers and is affiliated with the local university, Kenya University. Tamoo Day School

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<sup>2</sup> Pseudonyms are used for the participants' names, schools, and institutions.

is a co-educational primary day school. The community school at the Maasai Mara National Preserve is a boarding school for secondary students that have a one-year training program for tour guides at the Maasai Mara conservancies. The Maasai community members live in the Narok area and are not affiliated with the primary day or boarding schools but work for a variety of conservancies in the Maasai Mara. Table 1 provides additional background information on the schools including type of school, location, year established, and number of students and teachers. Table 2 provides demographics on the participants including pseudonym, self-selected ethnic group, place of employment, and educational background.

[INSERT TABLES 1 and 2 HERE]

### ***Data Collection and Timeline***

This study included two data collection phases: (1) photo-documentation and (2) focus group vignette sessions. The goal of Phase 1 was to ask the participants to document and define through photographs and brief statements their views of their thoughts on the environment. We used the terms, “environment,” “nature,” “sustainability,” “preservation,” and “conservation” to broaden the discussion beyond the singular term “environment.” The research team selected the original guiding terms as a beginning to our conversation with the participants about their environment. We discussed these terms with the participants and encouraged them to view these words as a starting point and to expand their ideas of these words. The participants discussed wanting to document both positive and negative examples of the terms. We encouraged them to do so. As such, in the data, the participants documented broad ideas surrounding these terms. The goal of Phase 2 was to develop emergent, co-constructed, shared understandings of the key terms. This study focuses on Phase 2 of the data collection (for results of Phase 1, see Author 1 et al. 2014).

The photo-documentation occurred over six months. Each participant was given a smartphone as a part of the project. We taught the participants how to use specific functions of the smartphones that were unfamiliar, such as the camera-phone, email, and web surfing. The participants used the smartphones to email their photographs and narratives (two to three sentences) from their phones to the researchers.

The focus group vignette interviews occurred over one week. We utilized the findings from our analysis of the photo-documentation data to construct the vignettes to provide meaningful context and authenticity (Author 1 et al. 2014a). In the photo-documentation portion of the study, we collected over 400 photographs with narratives surrounding environmental issues. Each participant took several pictures each week using a smartphone and emailed us the picture along with a narrative description of the picture. The narratives varied from 1-10 sentences in length. The Kenyan participants emailed the pictures and narratives to Author 1. The authors and the participants analyzed these photographs and their narratives in terms of the following topics: water catchment/harvesting issues, deforestation practices, human diseases due to poor water/air quality, waste disposal/sewage issues, population growth, alternative fuel sources, and navigating traditional practices of cattle grazing (For a complete explanation of this analysis, please see Author 1 et al, 2014b) We constructed several vignettes for each topic to ensure all topics were discussed during the interviews.

For example, Catherine, a teacher at Kwaeki Primary School, took a picture of a gutter used for rain harvesting. She included the following narrative with the picture:

I took this picture because it shows how rainwater can be harvested and stored for future use. The basic tank is built of stones, concrete, cement . . . the works and covered using iron sheets. Look at the improvised pipe from the roof gutter so that harvesting is maximized. The question is how

safe the water would be for human consumption? It is possible to build water tanks that can be cleaned adequately?

We showed the picture with the narrative and then asked follow-up questions such as:

What are the key issues related to the environment captured in the picture? Does this photo and narrative suggest ways for addressing these issues? Can you think of other ways of addressing this issue? The vignette suggests there might be a problem with using this type of rain harvesting. How do you decide if the risks are worth taking?

The vignette interviews consisted of eight to ten similar vignettes touching on each of the themes described above. We grouped the participants into four focus groups to allow for meaningful conversation. Because the participants from the Tamoo Day School and Community School at the Maasai Mara were close in proximity to each other, we brought those participants together for the first vignette focus group interview on one day with the other schools on another day. We mixed the teachers from the different schools so the teachers could talk to people from different schools about the topics. For the second focus group, we brought together the remaining schools and again mixed the participants to encourage conversations among the schools. The interviews lasted from three to four hours each.

Following the focus-group vignette interviews, we brought the groups together for a whole-group discussion to understand participants' reactions to the issues presented in the vignettes. Additionally, we utilized this time to discuss any challenges/successes the participants had with the methods. This interview lasted approximately one hour. For example, we asked the participants: "What were your overall impressions of taking the pictures and writing about them?" "Was there anything difficult about the process?" "Was there something you did not feel comfortable with?" "Was there something you particularly enjoyed?" and "Do you think there

would have been a better way for us to collect data from you on this topic? If so, what would it have been?”

### *Analysis*

The researchers analyzed the transcripts of the interviews for themes. We utilized in vivo coding. In vivo coding is also called literal coding or verbatim coding in qualitative research methods literature. In vivo's root meaning is “in that which is alive,” and as a code refers to a word or short phrase from the actual language found in the qualitative data record: “the terms used by the [participants] themselves” (Strauss 1987, 33). In vivo coding analysis is advantageous in forming patterns, particularly when studying a culture that is not your own, since one of the genre's primary goals is to frame the facilitators' interpretations of terms used by participants in “their everyday lives, rather than in terms derived from the academic disciplines or professional practices” (Stringer 1999, 91).

In order to conduct the coding, the interview transcripts were read while listening to the original interview. This helped to feature participant voices and vocal emphasis. Additionally, we noted features such as nouns with strong impact, action-orientated verbs, or evocative word choices. Moreover, we noted word choices such as ironic phrases, similes, and metaphors. If the participant often used the same words or phrases, we applied an in vivo code to it, meaning that we used the exact words or phrases of the participants. In this way, we kept track of codes that are participant-inspired vs. researcher-generated. For example, we kept the initial codes in the words of the participants, such as, “governments look the other way” or “culture is changing.”

After the initial coding, we had 86 codes. We reflected using analytic memo writing and a second cycle of coding and condensed the number of in vivo codes to 36 codes. Analytic memo writing is helpful for noting the rationale behind combining codes. For example, we combined

the codes “creating new technologies” and “finding new ways of cooking” into the code “innovations,” as these represented similar ideas. This also provided reanalysis of our initial work. We followed Strauss’s (1967) recommendation and examined the codes for dimension of categories instead of themes. In this way, we were looking for the continuum of shared perspective or schism. For example, since the participants often discussed the amount of governmental involvement, a continuum of no governmental involvement to total control by the government represents the dimension of categories. We felt this was most in line with our theoretical perspective, which asserts shared understandings occur due to participation in we-mode and divergent viewpoints in the form of schisms (including complementary and supplementary schisms).

## **Results**

During our analysis, we noted that when shared understandings occurred, they were about notions of positive or negative cycles of environmental issues. As described in the analysis section, we looked for continua of views instead of separate themes. Table 4 outlines these continua with an example of each.

<INSERT TABLE 4 ABOUT HERE>

While participants readily shared the notion that empowering individuals was critical to solving environmental issues, there was a continuum representing the ways in which they felt people should be empowered. The participants also spoke positively about ways to utilize indigenous peoples and their knowledge in order to decipher environmental issues.

When participants shared ideas of negative cycles in the environment they noted environmental degradation, but a continuum existed to the extent of that environmental degradation. Moreover, they noted that economics played a role in the spiraling of environmental

issues. However, the continuum noted was the specific role of economics (i.e., the extent to which economics influenced environmental actions).

In addition to sharing understandings surrounding environmental perspectives, there were also divergent views. Their views tended to diverge when discussing solutions to environmental issues. When the participants discussed solutions, they their views diverged on the involvement of the government. Their views also diverged on the extent to which innovation should be a part of the solution to environmental issues. Similar to other shared notions, these were represented on a continuum, and the extent to which the government should be involved was noted. Table 3 provides a description of these categories and the continua represented. Below we describe each category, dimension, and continua with examples of each.

<INSERT TABLE 3 ABOUT HERE>.

### ***Shared views: negative cycles of environmental degradation and economics***

As discussed above, the goal of the study was to understand where the participants' views were similar and where they were different. First, we discuss the participants' shared views. In this theme, participants described the connection of one action to another that continues a downward spiral of negative impact on the environment and society. The participants shared a view of a negative cycle of environmental degradation in which they described how one negative impact on the environment could lead to another issue. Below Fredrick, a teacher at Mata Day school, articulates this clearly when stating:

[Forestry] is going to be the big impact and you see it is going to cause a lot of things . . . the rate of desertification is going to quickly increase, which of course is going to add up to the current net of global warming and lack of water. Water in areas is going to reduce. . . . People are affected around the clock in such a way that apart from water that is actually the basic need.

During the interviews, the participants described downward cycles of environmental degradation. For example, Paul stated that the increase in population would lead to a future without forests in Kenya, while Fredrick described how the increase in population is affecting the migration of the wildebeests from the Serengeti to the Maasai Mara. Marcia then asserted that a growing population would encroach on the forest and eventually affect the rivers. Here, the participants' shared space is surrounding the notion of the negative of cycle environmental degradation. Interestingly, Fredrick and Marcia both operate in the I-mode during their statements, such as "I feel" or "In my opinion, I still think . . ." but there is agreement in these statements.

Similarly, the participants held similar views on the role of economy in environmental issues. The participants discussed the role of the stability of the economy in causing environmental issues while looking at a picture that depicted a charcoal market.

Charcoal in Kenya is prepared from live trees that are burnt to prepare the charcoal. The participants discussed how the charcoal was used for cooking and discussed the negative cycles of environmental degradation in relation to economic issues. In his photo-documentation, Seth, the principal at Community School, discussed how environmental issues are not isolated but are related to a larger system. Seth states,

This was of great concern to me because if 100 bags of charcoal are sold daily in this market, it means a lot of trees in the forest around Narok town are being destroyed daily. This is hazardous to the environment because of deforestation. This will cause erosion and drought.

He described the connection between the amount of charcoal sold for fuel and its implications for drought and deforestation. Participants discussed how economics played a significant role in this negative cycle. Faith, a teacher at Mata Day School, articulated this when saying,

The ones selling it are taking advantage of the poor people and taking advantage of the fact people will buy it, even if it is known to be bad for the environment. It kills live trees. It causes deforestation. It causes pollution.

Her perspective was that the charcoal burners (the ones who make the charcoal) are not to blame but are at an economic disadvantage and so make charcoal “even if it is known to be bad for the environment.” This shared understanding that economics plays a significant role in the negative cycles of environmental issues was a strong thread throughout the focus-group interviews, and as David, a teacher at Suswa Teacher Training School, questioned, “How can we tell them to stop in the name of the environment?” In this respect, David acknowledged that they are acting in the we-mode but is fearful of acting on this idea.

In a different group, the participants articulated the challenges related to economics and finding alternative ways for income. Jacob said,

The solution is in finding an alternative means of an income. Maybe they have realized that pastoralism (raising livestock and moving around with the livestock in order to graze the animals) is not good, the cows are very intensive on the land, moving around causes destruction, overgrazing which leads to erosion. The government cannot create permanent rubbish collection, recycling for those areas. But they would need an alternative to their life that has an income. It comes down to being able to support their life.

Similarly to the previous discussion, Jacob, a program coordinator for the conservancy, pointed to the cyclical nature of environmental issues (overgrazing and erosion and pastoralism making it difficult for support services such as recycling). However, Jacob also noted that one possible solution towards these environmental problems would be creating economic viability for the pastoralists. On a different but related note regarding economics, the participants

discussed importation of goods and the different economic challenges this presents to solving environmental issues. Below, Francis, the principal at Mata Day School, discussed one issue:

Because cheap is very expensive. When you look at this water tank, which is used to solve an environmental issue here. It is cheap because it is made cheaply in China . . . How much did it cost us from an environmental standpoint to ship that water tank here? What if it would have been manufactured in Kenya? You assemble and you bring that home, it breaks. You'll be using a lot of money in trying to do some repairs; in trying to do some replacement . . . it is really very . . . expensive from an environmental perspective.

Here, Francis described the challenges purchasing imported goods present in terms of environmental issues. He noted there are economic and environmental implications for buying cheaper goods that are important. He stated that, “. . . cheap is very expensive,” meaning there are other costs outside of the purchase price of imported goods. He stated the transportation of the goods as well as the quality of the goods plays a role in the environmental price of the commodity. In this respect, economics plays a role in environmental issues but unlike the other discussions that implicate poverty, this connection to commodities provides another important environmental consideration. After Francis' statement, Edith, a teacher at Kwaeki Primary School, looked to the group and in a we-mode action and waited for approval. Then she considered the alternatives and looked to the group for suggestions. When Francis provided the suggestion, he used the we-intention: “We choose not to buy the imports. We make our own.” Edith agreed with him. In this conversation, the we-mode intention is bounded by the idea that they agree that buying imports is harmful from an environmental perspective.

***Shared views: positive impacts of utilizing indigenous knowledge and empowerment***

The participants also described sharing understandings of the importance of utilizing indigenous knowledge and empowering communities. First, we discussed the shared understandings of utilizing indigenous knowledge.

During the conversation, the participants pointed to a specific forest that is protected because it is considered sacred. They discussed how the community supports this sacred forest and worked to protect it. Additionally, when Martha, the director of the conservancy, mentioned, “incorporating parts of this knowledge. This could be included in the school curriculum,” there was an overlapping speech pattern where the participants agreed with her statement. What is interesting to note is that even though they recognized this may not resolve all of the issues related to deforestation or challenges of protecting more forests, they viewed utilizing indigenous knowledge as a way to reverse some of the damage: as Martha mentions, “learn from it and expand on it.” There are also times when the participants operate from we-mode intention. Jacob made the statement “we are protecting it,” indicating that there was an action that they were involved in that protects the forest areas. Martha expanded on this and stated, “We could learn from this and expand on it.”

Similarly, the participants discussed other ways of utilizing indigenous knowledge. Mark and Annette, who are both teachers at the community school, described with Sharon, the principal of Suswa Teacher Training School, described how in many ways, incorporating indigenous knowledge is acting in environmental ways. Annette stated,

... By utilizing the indigenous knowledge, we could learn how to protect the forests. They already know how to protect the forests. They only use a part of the tree for their activities. They don't hurt the tree. And they don't use young trees. If they could teach these principles, then the forests could be protected.

Sharon continued, “They should be considered the environmentalists that they are. We should learn their practices. Not the other way around.” In this way, the shared understanding is that by using this knowledge it could change the current trajectory. Thus, the knowledge is there, it just needed to be incorporated into the current framework. Similar to the ways the previous group operated from a we-mode perspective, Sharon, Mark and Annette all utilized this perspective during their discussion when making statements such as “We should learn . . .” and “we could learn . . .” Thus the group made statements about their intentions to participate in such acts.

***Shared views: positive impacts of empowerment***

In this category, participants also commented on positive ways to cycle out of environmental degradation. However, instead of calling on indigenous knowledge, they described empowering specific people and communities. Here, instead of focusing on the negative cycles, they discussed the need for empowering women in the community, Mary stated, “. . . most of the people who really struggle out for the basic needs of the families are women. And you can see the sellers of that particular charcoal, they are women, . . . they are selling in order to accrue the little bits of the money.” Magda, a teacher at Mata Day School, responded:

. . . they are doing that in our community. They are breadwinners in our community. They make shelter. They burn charcoal, to go and sell. They fetch water, firewood. In our community, they provide small loans to women to help them choose more environmentally sustainable ways of living. By empowering the women, they will be able to make better choices . . . it will help to improve future generations; the other problems will be solved.

Interestingly, Mary and Magda, both teachers at Mata Day School, do not operate from the we-mode intention or action. Instead, Magda positions herself as a part of a community that is doing the action, “they are doing that in our community,” but not as a part of those doing the

action. Additionally, participants discussed other ways of empowering the community through education. For example, Edith stated, “I think the solution is in empowering through education and early education being the important role. Empowering people through education and starting with very young children. That is the key to sustaining the environment.”

The notion of empowering people through education was a shared space in which the participants saw as a way to “create a place that is more environmentally friendly” and in particular needed to involve the young people of Kenya. At times, the participants provided specifics such as teaching them to plant trees, or teaching them about recycling and reuse. However at other times they talked more generically about “teaching them awareness, especially the younger stages of their life.” Moreover, the participants used the we-mode intention throughout this conversation: Edith stated, “if we want to create a place . . . it will only be sustained if we involve the youth,” and Martin asserted, “We can teach them to do good.”

Despite these shared understandings of environmental issues, there were also divergent views. These divergent views tended to be around the topic of solutions to their environmental issues. There were two major areas of disagreement: the extent to which the government should be involved and the ways in which innovation could be involved in the solutions. We will first discuss governmental involvement and then innovations.

#### ***Divergent views: solutions involving the government***

When the participants began discussing solutions, involving the government was often mentioned. However, this was often a contentious conversation. Some participants felt that the solutions lay in the communities and that the communities should drive these actions, while others felt that without heavy involvement from the government, major changes would not occur. Others held different views regarding the amount of government involvement. Seth disagreed

with Martin and viewed solutions as community-driven. Martin saw the government as being a significant part of the solution and even questioned, “how could we do that with the government?” In this discussion, Seth, a principal from the local school, and Martin, a Maasai Chief, demonstrated a form of complementary schismogenesis. In this relationship, it is likely that Martin, because of his position as Chief, holds some power over Seth. However, Seth entered into a schism with Martin about the amount of government involvement. Martin first creates a schism when he makes the statement, “We must, let's stop this word government. The government as a way to save the environment? Ha! It must start with us.” Even though he used the inclusive we-mode word “we,” Seth responded by ratcheting up the schism and directing it at Martin when he said, “You say stop this word government.” As Bateson suggested, just as the schism becomes unbearable, there is a break. In the above conversation, this comes when Seth altered the way he is responding to Martin and he said, “I hear that it must come from us but we don’t have the power to make sure things get done elsewhere in Kenya.” He still does not agree with Martin but the tone of the conversation becomes more comfortable. To which, Martin also ratchets down and responds, “I understand but it must start with us.” In this way, his simple statement “I understand” helps to find some common ground but the clause that follows that statement indicates he still has diverging views about how to start.

In the conversation below, the participants have divergent views on the amount of government involvement. The participants blame different groups of people as they struggle to find the reasons for the problems and their solutions. During this conversation, they were reflecting on a picture depicting a trash heap in a community. The participants demonstrated different levels of involvement for the government. There was a schism surrounding whether or not government involvement would actually lead to the solution. Philip, a teacher at Suswa

Teacher Training School, began the conversation and said; “I think the people dwelling nearby are to blame for this mess at the same time we are also blaming the authority, the local authority that is concerned. Because we do have the ability to clean this up.” Then, Francis disagreed by saying, “This one has been a continuing problem because of weak legislation,” and stated that government intervention is the key. Rachel, a teacher at Tamoo Primary School, agreed with Francis saying that people are “left to do their own rule.” However, Anna initiates the schism by making the statement, “People must care. You realize we are not the same.” By presenting them as not the same, the participants’ ideas diverge. Anna creates a schism between “you” and “we” indicating that Philip is not a part of her we-mode intentions. Philip responded with a statement about the government’s role. To which Anna, a teacher at Mata Day School, continued to disagree. At that point both Francis and Stephen got involved in the schism. For example, when Stephen advocated for governmental involvement, he stated, “that the people themselves understand and own those solutions and implement the process.” So in this way, he described how the government could be involved but then the community acts. Stephen’s comment about the President and cutting down one tree but planting two, ratchets down the conflict. Anna responded, “true.” However, there are still differences on whether or not people should “care” or “just need to do it because it is the law.” Another diverging viewpoint occurred when Mary remarked there needs to be a “champion” found. In this transcript, the solution comes from the community instead of the government. From the beginning of this conversation, Mary presented her case inclusively, “I think we have good ideas.” She continued throughout using the we-mode intention, “we.” Despite these attempts, the conversation still ended up in a schism. Evan reacted to Mary’s comment and pointed to things that Mary has stated, “You say the Mara is a government project.” Instead of using the inclusive pronoun, “we,” he utilized “you.” Then Mary

responded by still utilizing the pronoun, “we” and stated, “We cannot rely on the government. Leave them out.” Here Mary, operated as an individual in the group context by making her statements as an individual but also used the form of “we” in “we have got to take responsibility” which made it an action-oriented statement. She concluded with an “I believe” statement, which changed the tone from “we” to “I.” In this way, this schism is not resolved.

### ***Divergent views: solutions and innovations***

In addition to divergent views about the extent of government involvement in solutions, the participants’ ideas diverged about using innovations to make progress towards solving environmental issues. Although not a major schism, the participants’ views differ according to the extent that they believe innovations should be utilized. Simon stated, “I want to go back to solution. It is unrealistic to go to the alternative sources of these and looking at it for their own settlement isn't realistic because . . . they would need to travel a great distance for fuel. So these solutions you are proposing? They are not realistic.” Faith and other participants disagreed, “We have to try and implement these other sources. To think to the future. To try.” In this conversation, the participants disagreed on whether the alternative energy sources were realistic to use. In this case, the participants diverged on whether or not they should think about future generations and try utilizing different resources other than charcoal.

In perhaps the most contentious conversation, about the extent to which innovations could help become a part of the solutions, the participants’ viewpoints diverged. Simon stated, “So these solutions that you are proposing are not realistic.” Similar to other schisms, when Simon used pronoun “you” there was a divide between him and the other participants. Even when Faith employed the we-mode tactic and said, “We have to try . . .,” the ratcheting-up continued, as Simon shot back, “No, it’s not realistic for us.” Author 1 even tried to make the

conversation more comfortable by asking a question but the conversation continued to diverge and Faith responded, “Yes, but that is why we have to have the other sources available. If it decreases the use, we have to use something.” Even then Simon responded with another statement that caused a greater divergence in the viewpoints: “It is still not reasonable. These so-called alternatives don’t work. You cannot expect it when people are surviving.” The last statement he made was particularly dividing, which led to silence among the group and a change in conversation by the interviewer. In this moment, the schism was temporarily ended through the change in conversation even though the participants’ viewpoints were not resolved.

In a less combative conversation, participants challenged each other on the issue of alternative fuels and its connection to deforestation. They discussed how innovations could reduce the necessary amounts of charcoal or other types of fuels for cooking. Louise felt it was necessary to “improve the jicos. [There] is a certain company the produces [the super cheap coal] where you put a little charcoal [in it and it] puts off a lot of heat and you try and keep the pot cooking even without the charcoal. That is one of the solutions.” In this conversation, the participants discussed alternative fuels. There were several innovations mentioned, including improving the jico (a stove that is used to burn the charcoal), briquettes (made from cow dung), and solar energy. While several of the participants felt these were ways to improve or to employ these innovations, others thought these ideas were not feasible. For example, Julia stated that these innovations were too expensive. Even the idea of using gas seemed too expensive for everyday use. The participants also pointed to other issues about these innovations. For example, the briquettes were problematic because of the smell and because they didn’t last as long or warm the house in the same way that charcoal does. They felt that the use of charcoal was simpler: “You just buy it.” In this way, the conversation was not a major schism but rather a

differing of viewpoints. Importantly, throughout the conversations, the participants employed the I-mode but did not position themselves as a part of an opposing group. In this way, the group entered in symmetrical schismogenic moment as they were having this discussion. They were united in their feelings about the briquette, but still did not agree on what type of fuels should be employed.

In a similar conversation, a participant mentioned the use of the innovation biogas (an alternative renewable fuel source). The participants discussed the challenges as a part of this innovation. They disagreed about the reality of using these innovations to actually resolve the problems. Money is a concern that the participants expressed as well as the ability to “scale up.” Jacob described the need to “provide more consistent energy across the country.” Employing Bateson’s notion of schismogenesis, this conversation represents a symmetrical schismogenesis, in which the participants are readily disagreeing but using language that is less confrontational and blaming. For example, Matthew responded, “I would say maybe for biogas.” By using the I-mode, Matthew provided his opinion without positioning himself against anyone else. Additionally, Catherine is responded to Mark’s notion that the concrete is very expensive in the creation of the biogas facility and said, “Maybe . . . .” Again, by using less definitive language, it provided an environment that is conducive for discussion instead of closing off the conversation. In this way, they entered a symmetrical schism, as Bateson suggested, by ratcheting down the conversation to permit dialogue. Jacob reacted to this comment by pointing out the problems with Catherine’s suggestions but similarly to the other participants in this conversation, used the first-person I-mode to indicate these are his opinions. He does position his ideas above the others when he states, “this instead of these small innovations.”

In summary, we presented the findings from shared and divergent viewpoints in three categories (positive impacts, negative cycles, and solutions; See Table 3). Although the topics varied from alternative fuels, recycling, and waste management to pollution, there were moments when the participants both shared views and disagreed greatly. The goal of the present study was to document the viewpoints of environmental perspectives of Kenyan teachers and community members and to discover their divergent and shared views. Throughout the conversations, we witnessed moments of shared understandings and moments of discord. In the following section, we provide further analysis on these viewpoints and provide implications for environmental education.

## **Discussion**

As a field, environmental education is more than 40 year old with a history that was dominated by quantitative applied science research with a focus on behavior/attitude change. However presently, the field is vast and varied with an understanding that learning is a social endeavor, full of multiple perspectives and that a wide variety of methodologies is necessary for understanding the ways in which people interact with the environment (Gough, 2013). Despite this shift, there are still many voices on the margins of environmental education research (Russell & Fawcett, 2013). One voice is that of indigenous environmental education with the particular importance on context. Therefore, this research sought to highlight the voices of teachers in areas in Kenya who are currently marginalized in the field of environmental education. Not only because their voice is rarely heard but they are at the mercy of Western influences to solve environmental problems in their communities (Shava, Krasny, Tidball, & Zazu, 2010). Shava (2013) calls for studies that include, “. . . contextual relevance, validity, and acknowledging different ways of knowing.” (391)

In the broad sense, this study is about different ways of knowing and ways they view the environment. Sometimes the perspectives were closely aligned and other times the perspectives diverged. Throughout this study, we noticed the participants' shared *we-perspective*. Tuomela (2007) calls this intention to act as a group *collective intentionality*. This collective commitment includes affective elements and actions based on these components.

In our findings, the participants used the we-perspective when they were functioning as a part of the group and also when they were acting as an individual in a group context. These ideas are supported by Tuomela's research. For example, he called the former case the we-mode (or group mode) and the progroup I-mode. Additionally, he noted there is times when people do not act or think using *collective intentionally*, instead they operate from the plain I-mode (or private mode).

In our work, we noted that when the participants disagreed about environmental issues, there was the use of *we-mode* that positioned one group against another. Although Tuomela's work explores the shared point of view, he discussed dissent among groups. Typically, there are intentions or actions that are not ethos-compatible that cause the dissent. Accordingly, in our work, the topic of solutions to the environmental issues was not compatible with certain participants' ethos and there was dissent. It is not surprising that solutions to environmental issues would bring about disagreement. In fact, the difficulty of finding a solution is one of the reasons they are called wicked problems and is often due to differing perspectives. In fact, Weber and Khademian (2008) called these problems particularly wicked because of their unstructured, crosscutting and relentless nature.

Additionally, there were disagreements surrounding government involvement and innovations. Government involvement is an ideologically complex problem in itself and one that

often sparks heated debates. In our study, the participants debated the extent to which government should be involved. Some participants felt the community should be in control of the solutions. As Martin stated, *“It must start with us.”* Similarly, Mary stated, *“We're only lack the starting point. We need a champion. We need a person in the community.”* In this way, the participants that called for more community-driven action were operating from Weber and Khademian’s recommendation of the need to examine solutions in the wicked problem setting. They call for the end to solutions created in a vacuum. Instead they state the need to draw on context-rich knowledge bases, to develop new usable knowledge and share the knowledge that encourages cooperation and not control. In this way, there is not one person dictating when, where and how but yet a collaborative capacity built that facilitates and integrates knowledge from the community to address the wicked problem. Not surprisingly, this is counter to heavy government involvement and points to why the schism of government involvement was complimentary at times. The other participants, who disagreed with this, believed the government was the answer to environmental problems. They felt the solutions seemed insurmountable without government involvement. The participants who wanted more government involvement were most likely familiar with these types of approaches and feared for other nonstandardized ways of solving these problems. Additionally, as these problems are occurring in their community, there could be a sense that the problems are overwhelming and by calling for community-driven actions, the participants were calling for each other to act. That is a tremendous task.

The question then becomes how do we shift the conversation away from schisms towards more shared perspectives or towards understanding each other’s perspective. This is particularly important when we consider the work of environmental educators whose goals are multifaceted

in that they are grounded in multiple perspectives but ultimately seek to create a populace that has the knowledge, skills, and awareness to work both individually and collectively to solve and prevent environmental issues (UNESCO-UNEP., 1976). Perhaps by drawing on Bateson's notions of shifting the schism to encourage communication, the parties could come to a common ground so that the conversations surrounding environmental issues could continue.

Understanding multiple viewpoints is a step towards avoiding fragmentation. For instance, by encouraging groups to interrupt complementary schismogenesis by participating in an act of symmetrical behavior this could ease the strain and promote collaboration. In this study, the participants disagreed on the amount of governmental involvement, perhaps by becoming involved in community-driven actions that are supported by the government, the groups could find an area to work towards similar goals. Tuomela would call this action, *collective action*, which could ease the schismogenic strain.

Another option is finding ways to change the purpose behind the complementary opposition. For example, in the schism over innovation, the participants challenged each other on ways that alternative fuels could be used to help with deforestation. However, many participants felt these alternatives were unrealistic because of economic reasons. But if there were a program that subsidized the innovation, which would make it affordable for all Kenyans, perhaps this would make the idea more supportable. The third option was witnessed in our conversations, which was a shift in tone and discourse among the participants to make it more comfortable. For example, in the conversation between Mark, Jacob and Catherine, Catherine ratchets-down the conversation by using less definitive language such as "*Maybe*" and operating from the *I-mode*. Just as Bateson suggested, this permits the dialogue to continue and lessens the schismogenic strain. The last suggestion was if groups could join together to oppose another group. This could

happen if there was a solution presented that neither of the groups agreed. One example of this was in the schism surrounding the use of solar energy versus other fuels. The participants disagreed on the use of alternative fuels but all agreed that briquettes (cow dung and grass) were not a viable solution because of the smell. Here, they united against the use of briquettes but still retained their original feelings on traditional versus alternative fuels. These suggestions still call for interactions between the participants, which is important. As many researchers of wicked problems insist, making progress on these problems is really solving the problem with interactions. Solving the problems of interaction is one of the tenets of social learning and should be connected to environmental education. When participants are viewed as experts and are a part of the creating solutions, they are more likely to be motivated to enact those solutions (Krasny & Lee, 2002; Wals, 2007)

As described previously, wicked problems typify many environmental issues. The resources necessary to tackle the problems are scattered across different groups and as long as there is no shared perception of the content of the problem, it is difficult to define the solution. From this perspective, dealing with environmental issues is to come to a shared view on the problems facing communities. To this point, the traditional approaches, often top-heavy ones, fail. Moreover, research cannot resolve differences in perceptions of the problem and its possible solutions. However, by presenting progressive, community-based settings to explore shared and divergent views, we were able to document the ways in which this community viewed its environmental issues and shared some views. First, the participants noted positive impacts and negative cycles related to the environmental issues.

This notion of negative or downward cycles, of environmental issues is well documented in the environmental sciences literature. Tidball and Krasny (2011) described these notions of

positive or negative cycles as a part of resilience theory. The positive or upward cycles are called virtuous cycles. The negative or downward spiraling of environmental degradation are called vicious cycles.

The resilience perspective is often used as an approach for understanding the changes of social-ecological systems. While much work on resilience focuses on the capacity of the system to handle shocks and still maintain function, recently, there has been a shift to understand renewal, and development of a system (Folke 2006). In a resilient system, changes have the opportunity to create new things. In a vulnerable system, even small change has the potential to cause great destruction. Previous perspectives assumed an infinitely resilient system that would self-repair and restore equilibrium when human stressors are removed. However, there are few instances where this actually occurs, as there are few spaces with human stressors completely removed. The resilience perspective shifts policies towards managing the systems to help “cope with, adapt to, and shape change.” (Folke 2006, 254) In this way, when managing for resilience occurs, it increases the possibility of sustaining advantageous paths. In this framework, the goal is to teach how not to be that destructing force.

Resilience in social-ecological systems examines the following: (1). The amount of change a system can undergo and still maintain its identity (such as a city maintaining a green space that is used for a children’s playground even though a large overflow parking lot is built through it). (2). The ability of a system that has degraded but can still rebuild (such as the same green space being described previously no longer used for a children’s playground resulting in vacant area used for dumping but then is rebuilt by the community through civic activity).

One component of the resilience framework is the virtuous and vicious cycles. These represent the interactions that are typically self-sustaining and reinforce one another. If the

influence is negative, they are considered vicious cycles. If the influence is positive, they are considered virtuous cycles. As the participants described the environmental degradation causing further and further degradation, they were operating under the notion that these issues have a direct affect on one another. For example, deforestation of the Mau Forest might be considered a vicious cycle of environmental degradation by causing soil erosion leading to changes in the rainy seasons causing an economic loss through tourism as the wildebeest migration is delayed due to water shortage. Paul and Fredrick described a vicious cycle of increased population, which would cause forest destruction in the Mara due to increased fuel needs (using the wood as charcoal) leading to water shortages in the Mara, which affected livestock and wildlife that depend on the river as a water source. Fredrick then stated this could lead to humans fighting over water as they would try and demarcate the water sources for individual use. In this way, the cycle continued in a downward trend affecting many natural resources and ways of living.

Tidball and Krasny suggested that these cycles are capable of “flipping” to virtuous cycles of renewal. For example, if the people who live in those areas self-organize to prevent deforestation and demarcation of water sources, protecting the source as a site of social and economic capital, the cycle can flip. In this way, we posit that when the participants describe the positive impacts such as utilizing indigenous knowledge and empowering communities are attempting to establish a virtuous cycle. As Tidball and Krasny described, moving from a vicious cycle to a virtuous one involves movement often in the form of stewardship. This is where environmental education becomes critical.

Traditionally, environmental education focuses on humans as a destructing force on the environment instead of having the ability to restore/improve systems (Wimberley 2009). Resilience theory counters the current narrative of traditional environmental education, which

tends to expose youth to green spaces (e.g., hiking, camping) instead of providing them opportunities for action on spaces that are emerging from vicious cycles. In this way, the students do not act in isolation and can be a part of efforts that are ongoing and are already moving from vicious to virtuous. Environmental education acting alone without providing context-based, real-life situations for students to discuss their perspectives about environmental sustainability cannot realistically bring a social-ecological system from a vicious to a virtuous cycle. With resilience theory, the goal is to teach people not to be that destructing force—and to be a part of the solution.

## **Conclusions**

If there is not a shared perception of the environmental issues, it is difficult to decide upon a collective or collaborative action. From this perspective, making progress on wicked problems is to a large degree a matter of interaction. In this article, we argue that due to the complex and often ill-defined issues of environmental problems, enhancing the interactions between stakeholders can lead to solutions. However, coming to solutions on contested issues is challenging. Decisions based on disputed issues can be polarizing if it does not engage the community that it involves.

These notions of vicious cycles are related to Churchman's wicked problems. However, we posit that understanding these virtuous and vicious cycles can provide a way to understand how communities might interact to create more sustainable actions through environmental education. Additionally, by understanding the common perspectives of the communities (here, the tendency to see continuous casual links between one negative affect that will cause another negative environmental impact) and the ways in which they operate from symmetrical schismogenesis, we can further understand the reasons for inaction that are often associated with

these perspectives.

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