

# Perspectives of Effective and Sustainable Community-based Natural Resource Management: An Application of Q Methodology to Forest Projects

**James S. Gruber**

Antioch University New England, Keene, NH, USA;

and

R. Bošković Institute, University of Zagreb, Zagreb, Croatia

*Current Affiliation:* Department of Environmental Studies, Antioch University New England, Keene, NH, USA

**E-mail:** [jgruber@antioch.edu](mailto:jgruber@antioch.edu)

## Abstract

Community-based natural resource management (CBNRM) has been recognised as an effective governance approach for sustainably managing commons or common-pool resources. Yet there is limited empirical research on answering the critical question: What are the principles and key characteristics that are needed to ensure long-term effective and sustainable CBNRM programmes? The research described here helps answer this question. For the first phase of this research, multiple perspectives from research teams were collected and organised into a matrix of 12 organisational principles and 60 key characteristics. These were then vetted using a large published collection of World Bank CBNRM case studies. The second phase of this research included site visits and the use of Q-sort methodology to understand the perspectives of a range of constituency groups associated with three successful forestry CBNRM sites. These sites are located in the Apuseni Mountains, Romania, Randolph, New Hampshire, and Ixtlán de Juárez, Oaxaca, Mexico. The findings, based on conducting principle component multi-variable analysis of the sociological and organisational data, point to four unique perspectives of what is essential for effective governance of their common-pool resources. There were also a number of areas of consensus across all four sites. Some of these findings transcend cultural differences, while others are directly associated with specific local conditions and cultural characteristics.

**Keywords:** commons, community-based natural resource management, CBNRM, community capacity, Q-sort, community-based conservation

## INTRODUCTION

The serious deterioration or collapse of ecological systems

has occurred and is continuing in every continent (Millennium Ecosystem Assessment 2006). The previous natural products and services that have sustainably supported numerous local indigenous economies for generations is at risk. This has led to increased poverty, dislocation, and other serious disruptions of these societies. It has also contributed to greenhouse gas production and climate change due to CO<sub>2</sub> release as a result of forest destruction. It is estimated that 18.3% of the generation of greenhouse gases results from current deforestation practices (World Resources Institute 2005).

Centrally planned natural resource management efforts,

Access this article online	
Quick Response Code:	Website: <a href="http://www.conservationandsociety.org">www.conservationandsociety.org</a>
	DOI: 10.4103/0972-4923.83725



Q-methodology using a screening process (Table 2). The screening process criteria included examining each site for economic, environmental, equity, and empowerment indicators of success.

#### ***Apuseni Natural Park site in Romania***

The Apuseni Natural Park site (76,064 ha) is located in the north-western corner of Romania. Carnivores such as lynx, wolves, and brown bears still survive in this region. This forested mountainous region of Cluj County with approximately 40,000 residents contains 12 sub-regional communes, each with two to seven small villages. Settlements in hamlets and villages are small, connected by narrow, poorly maintained, unpaved roads. The population is a mix of cultures including Romanians, Hungarians, and some gypsies. The economy consists of limited agriculture and animal husbandry, rural tourism, timber harvesting, and some light industry. There are several new tourism centres under construction. This site is in a country that is considered a rapidly changing 'transitional economy'<sup>2</sup> with annual growth rates of over 6% prior to the 2009 recession.

In 1992, Clubul Ecologic Transilvania, a local non-governmental organisation (NGO), initiated a community-based strategy to sustainably manage this vulnerable forest of the Apuseni Mountains of Transylvania, which had been experiencing non-sustainable exploitation and rapid deterioration since the collapse of the communist party. The overall approach is described as 'protection and sustainable use of protected natural areas with and for local communities' (Clubul Ecologic Transilvania 2005). The Natural Park of the Apuseni Mountains was chosen as an effective and sustainable CBNRM effort, by meeting the screening criteria (Table 2), that included its successful reputation from a number of sources and its documented 16 years of community-based work.

#### ***Randolph Community Forest site in New Hampshire, USA***

The Randolph Community Forest (over 4,047 ha) is located in the towns of Randolph and Jefferson in Coos County, New Hampshire, USA, adjacent to the White Mountains National

Forest (Child & Lyman 2005). Current wildlife in this boreal woodland region includes bears, deers, moose, and foxes. The year-round population of Randolph is under 400, with a larger seasonal population. The economy of this mountainous region is primarily timber harvesting, maple sugaring, and recreational tourism (including hunting, fishing, hiking, and climbing). This site is in a country with a fully 'developed economy'.

The Randolph Community Forest project was initiated in 1997. It developed and established a new stewardship plan through a multi-year effort that included local and regional NGOs, state and federal governments, private philanthropic efforts, and many local citizens. The Randolph Community Forest project's overall goal includes three main objectives: shifting from pulpwood extraction towards a new emphasis on sustainable long-term hardwoods and green-certified saw log production, supporting appropriate outdoor recreation, and promoting ecological protection. It is anticipated that the achievement of these goals will encourage a return of the lynx, black bears, and other species. Leadership for this major initiative came from local residents. This innovative, community-based effort has been recognised by numerous regional and national environmental and land-trust organisations in the USA, and met the screening criteria in Table 2.

#### ***Ixtlán de Juárez Communal Forest site in Mexico***

The Ixtlán de Juárez Communal Forest (19,310 ha) is high up in the Sierra Norte Mountains located in the north-eastern region of Oaxaca, Mexico. The Sierra Norte highlands region, recognised as a World Biosphere Reserve, is one of the best preserved biospheres in Mexico. This region, dominated by pine and oak forests, is home to hundreds of bird species and thousands of plant species. The Town of Ixtlán de Juárez located at an elevation of 2,030 m with a population of 2,479, was founded in the latter half of the fifteenth century by the indigenous Zapotec people. This site is located in one of the poorest regions of a country that has a developing economy.

After many years of the forest being exploited by a Mexican

**Table 2**

#### ***Screening criteria for selection of CBNRM field sites***

The following is the screening criteria that were used for identifying effective and sustainable CBNRM organisations.

1. The organisation has been perceived locally and regionally as successful\* and is currently active in community-based natural resource management.
2. The organisation has as a major focus the managing of one or more natural resource.
3. The organisation has been successful in managing a natural resource(s) by making progress towards recovery of one or more natural resource(s) and/or by practicing sustainable harvesting/management.
4. The organisation has at least a 10-year history.
5. The organisation appears to apply the principles of sustainability.\*\*
6. Representative(s) of the organisation have internet access. At least one person speaks English or can communicate via an interpreter/translator.
7. The organisation is large enough to have involvement from a wide range of individuals, who represent a diversity of constituency groups, and who are familiar and knowledgeable about the organisation.

\*Indicators of success include: a) Economics: External funding is either not needed or there is a reduced dependency on this funding, b) Environment: Natural resource systems are recovering and/or there is sustainable harvesting/management of natural resources, c) Equity: The equitable sharing of financial and natural resources is recognised as important, d) Empowerment: There is strong social and organisational capacity in the organisation.

\*\*Working definition of sustainability: There is an effort within the organisation to achieve a balance among four characteristics: ecological integrity, economic security, empowerment and responsibility, and social well-being.

national paper company, the Ixtlán de Juárez Communal Forest was established in 1988. Since then, the lumber is sustainably harvested from a forest that has management practices certified by the Forest Stewardship Council and the Programme for the Endorsement of Forest Certification Schemes (the European equivalent). In 2005, the Ixtlán de Juárez Communal Forest established a modern and well equipped on-site furniture factory that manufactures green-certified doors, desks, chairs, bookshelves, and related school and office furniture. These are sold primarily to schools and to the government. The community has also established an eco-tourism programme that includes lodges, a dining facility, trail systems, and related amenities. This 20-year-old community-based programme has established an international reputation for sustainable and green-certified forestry practices, and as a centre for eco-tourism.

## Methods

To identify the unique and shared perspectives (or discourses) on successful and sustainable CBNRM, Q-methodology was applied. This methodology was originally developed by William Stephenson (Stephenson 1935) in order to assess individuals' priorities about an issue. It is designed to recognise the different value systems of different constituents (Brown 1980). This approach can also illustrate underlying patterns between groups or individuals that have broad shared values, and can capture 'the way in which meaning is organised and patterned' (Brewerton & Millward 2001). More recently, it has been recognised and established as a valuable approach or tool in assessing environmental studies, environmental management, policy, and decision-making (Brown 1986; Addams & Proops 2000; Weblor *et al.* 2001).

The basic difference between Q-methodology and standard survey analysis is its design to establish patterns within and across individuals rather than patterns across individual traits, such as age, class, etc. (Barry & Proops 1999). Q-methodology uses hundreds of extracted statements from stakeholders to develop a 'sub-concourse' of statements that are representative of the issue or controversy that is being studied. Each participant ranks a representative sub-set of these statements (referred to as Q-sort statements). Each individual's group of rankings (called Q-sorts) are then factor analysed to explore patterns in the data collected, and their association with different constituency groups. The result is the development of factors (or group perspectives, or discourses) based on shared values and meanings.

Six primary steps were followed to achieve the research goals using Q methodology.

### **Step 1. Identify a concourse of statements and develop a coded sub-concourse of statements**

First, a broad literature review of CBNRM research was conducted. From the 23 peer-reviewed research papers selected, a total 222 characteristics of effective CBNRM were coded. These coded statements were then grouped into 12 organisational principles<sup>3</sup> (Gruber 2010).

Second, a random set of 45 cases was selected from the 240 case studies that were submitted to the World Bank International Workshop on CBNRM (World Bank 1998), with no more than two cases from a country. Each of the 45 randomly selected cases was then rated, based on the level of specificity (but not content) of information provided in the case study. This resulted in 24 case studies (from 23 countries) (Figure 1) being chosen that had the highest level of specificity<sup>4</sup>. From these 24 case studies, a total of 238 text statements that were associated with an effective and/or successful CBNRM initiative were extracted and coded utilising the previously developed matrix of 12 organisational principles. These text statements created a large 'communication concourse' that represents a discourse of practitioners on CBNRM. As described by Addams and Proops (2000), a discourse is a 'way of seeing and talking about' an issue. This initial research and findings (Gruber 2010) provided the sub-concourse of statements, and the framework necessary for the development of Q-sort statements.

### **Step 2. Select statements to be included in Q-sort**

The Q-statements were selected from this sub-concourse of 238 coded statements. A total of 36 Q-sort statements were chosen as the most manageable number of statements with the guideline that each of the 12 organisational principles would have a minimum of two associated Q-sort statements.

### **Step 3. Develop screening criteria for selecting effective and sustainable CBNRM field sites**

The screening criteria used to choose field sites was based on the working definition of CBNRM by Armitage (2005):

CBNRM is generally viewed as a mechanism to address both environmental and social economic goals and to balance the exploitation and conservation of valued ecosystem components. It requires some degree of devolution of decision-making power and authority over natural resources to communities and community-based organisations.... [This approach] seeks to encourage better resource management outcomes, with the full participation of communities and resource users in decision-making activities, and the incorporation of local institutions, customary practices, and knowledge systems in management, regulatory, and enforcement processes.

### **Step 4. Identify CBNRM field sites and Q-sort participants from each site**

The three CBNRM field sites were chosen using several criteria. First, they met all the specific criteria listed in Table 2. Second, they represented programmes in different national, geographic, and cultural areas. Third, they were embedded in economies in different stages of development (developing, transitional, and developed economies). And finally, in order to reduce other variables, three forest community-based programmes were selected. In order to survey a wide variety of viewpoints, the 30 participants represented all major stakeholder groups<sup>5</sup>, such as local elected officials, members

of local or regional environmental NGOs, regional/national governmental officials, external experts/consultants, citizens, and business owners. A significant number of these individuals held multiple roles.

**Step 5. Administer Q-sorts, qualitative surveys, and conduct site visits**

A qualitative survey was completed by each participant. This included some basic demographic information, their primary areas of involvement with the project, and six open-ended questions to solicit their opinions on the project. This information was later used to help interpret results from the Q-sorts.

Each of the 30 individuals chosen completed a Q-sort either online using Flash-Q software (Hackert & Braehler 2007), or by using 36 small printed statement cards. The sorter having the 36 Q-sort statements in a random order, sorts them into three piles (most important, least important, or neutral). Each of these cards is then placed into a box located in one of the seven columns (+3=most Important, 0=neutral, -3=least Important). This is a forced sorting in that each column has a limited number of boxes. The columns of boxes are shaped as a normal distribution (or Gaussian curve) as illustrated in Figure 2. After each individual completes their Q-sorting, they are asked, either in person or online, to explain why they chose the two most important statements (+3) and the two least important statements (-3). This information is helpful in interpreting the findings.

**Step 6. Analyse data using factorial analysis software**

The data was analysed using PQMethod software by Peter Schmolck<sup>6</sup>. Specifically, the Principle Component Analysis algorithm was used to complete a factor analysis. The factors were then rotated to identify the best solution using the Varimax algorithm<sup>7</sup>. Four factors were chosen to best interpret the range of perspectives based on the criteria recommended by others (Barry & Proops 1999; Webler *et al.* 2009).<sup>8</sup>

**RESULTS: Q-SORT FACTOR ANALYSIS**

The findings from 30 individuals from three different cultures/sites revealed four unique factors (or perspectives). The results are illustrated in Tables 3, 4 and 5. Table 3 illustrates that these four factors represent the perspectives of 29 of the 30 participants, explaining 53% of the overall variance. Loading on a factor<sup>9</sup> requires  $P < 0.05$  probability. Only one individual did not load significantly on any factor. Table 3 also indicates which individuals agreed or disagreed with each factor and by how much. In Table 4, each of the four columns of factor rankings A, B, C, and D represents an optimal Q-sort (illustrated as a normal curve or Gaussian distribution in Figure 2) that was derived using all Q-sorts, that were statistically significant for that factor. The far right column indicates consensus and concurrence statements for all four factors. Table 5 illustrates the correlations of the four factors with Varimax rotation.

**INTERPRETATION OF FINDINGS**

A traditional way to present the results of a Q-sort factor analysis is to create a descriptive label for each factor and an accompanying narrative. Numbers in parentheses (at the end of the statement in the analysis below) refer to specific Q-statements that are listed in Table 4 and Figure 2. The interpretation of these unique perspectives draws upon additional comments provided by participants during interviews, and clarifications they provided on their ‘most important’ and ‘least important’ Q-statement choices. The four identified perspectives (Figure 3) are:

**Perspective A: A Successful CBNRM Programme Builds Social Capital Including Partnerships**

Factor A describes a perspective that values a concerted pro-active approach to community involvement and active

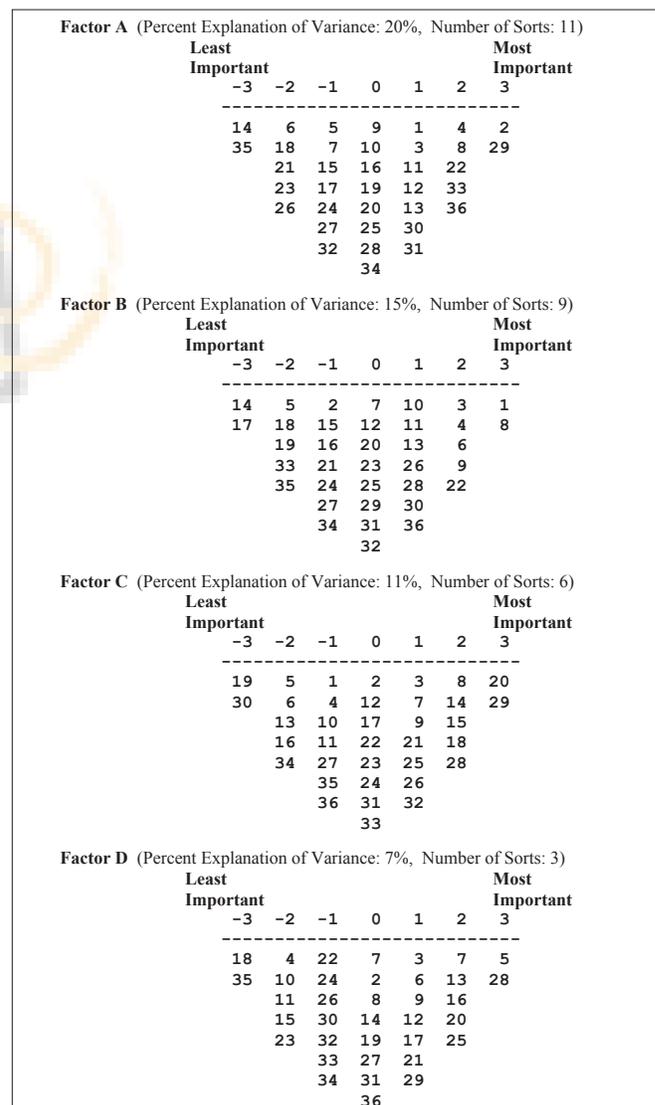
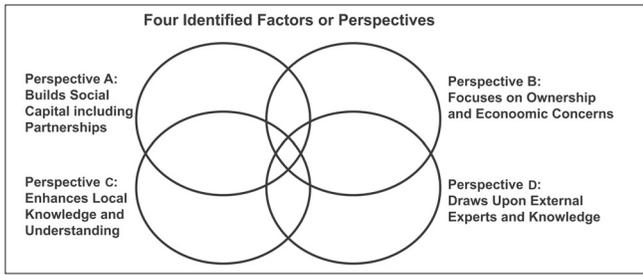


Figure 2  
Optimal Q-sorts for factors A, B, C, and D



**Figure 3**  
*Four identified factors or perspectives*

participation in the CBNRM programme (2). Participants whose views make up this perspective believe it is useful to get an early start by initiating activities that bring people together (33). They strongly support decision-making processes that embrace direct input of community values and knowledge (29), and emphasise inclusive, open, and transparent processes (22). This perspective is clearly reflective of the concept of social capital as described by *Putnam et al.* (2003) to include robust local social networks, strong community norms, and trust.

Partnerships, both external and internal, were also

**Table 3**  
*Re-ordered factor matrix with significant loadings*

Participant No.	Participant	Research Site	Factor A	Factor B	Factor C	Factor D	Affiliations
<b>Factor A: A successful CBNRM programme builds social capital and partnerships</b>							
2	W. W.	Randolph, NH, USA	0.66*	0.17	-0.13	0.14	Forester
4	W. D.	Randolph, NH, USA	0.75*	0.20	-0.03	0.04	Town Moderator, Planning Board, Forest Commission
5	S. K.	Randolph, NH, USA	0.68*	-0.03	0.16	-0.46	District Forest Ranger
6	T. E.	Randolph, NH, USA	0.61*	0.21	0.07	0.12	Local News Reporter, Member of Mountain Club, Forest Commission
7	C. J.	Randolph, NH, USA	0.52*	0.09	0.21	-0.06	Biologist, Environmental Consultant
8	E. B.	Randolph, NH, USA	0.84*	0.16	0.04	0.12	Conservation Commission, Planning Board
10	E. A.	Randolph, NH, USA	0.62*	0.23	0.27	0.36	Planning Board
11	D. M.	Randolph, NH, USA	0.66*	0.25	-0.06	-0.16	Snowmobile Club
12	G. W.	Randolph, NH, USA	0.63*	-0.03	-0.30	-0.44	Conservation Commission, Environmental NGO
13	K. R.	Randolph, NH, USA	0.66*	0.04	0.13	-0.15	Land Conservation Foundation
14	S. J.	Randolph, NH, USA	0.78*	0.32	-0.09	0.01	Planning Board, Regional Planning Commission
<b>Factor B: A successful CBNRM programme focuses on ownership and economic concerns</b>							
1	M. J.	Randolph, NH, USA	0.25	0.67*	0.01	0.01	Local Forest Fund-raising Foundation Environmental Groups
3	L. L.	Randolph, NH, USA	0.25	0.65*	0.11	0.25	Board of Selectmen
9	M. D.	Randolph, NH, USA	0.39	0.57*	0.03	0.22	Mountain Club
16	A. K.	Apuseni, Romania	0.22	0.51*	-0.37	0.01	Regional Environmental NGO
17	G. P.	Apuseni, Romania	0.05	0.42*	-0.24	0.31	Regional Economic Development Council
18	A. P.	Apuseni, Romania	-0.11	0.71*	0.00	-0.28	Village Vice-Mayor
19	G. A.	Apuseni, Romania	0.32	0.57*	-0.15	-0.05	Village Mayor
21	M. S.	Apuseni, Romania	0.26	0.53*	0.12	0.12	Park Ranger
22	P. G.	Apuseni, Romania	0.13	0.88*	0.09	-0.04	Regional Environmental NGO
<b>Factor C: A successful CBNRM programme creates local knowledge and understanding</b>							
24	R. L.	Oaxaca, Mexico	0.01	-0.34	0.73*	0.03	Community Authority Official
26	M. P.	Oaxaca, Mexico	0.18	-0.11	0.77*	0.08	Local Council Member
27	A. B.	Oaxaca, Mexico	0.00	0.34	0.35*	-0.04	Manager Community Organisation
28	M. A.	Oaxaca, Mexico	0.21	0.13	0.77*	-0.05	Administrator of Eco-tourism Organisation
29	P. M.	Oaxaca, Mexico	0.25	0.14	0.70*	0.07	Community Authority Official
30	F. C.	Oaxaca, Mexico	0.09	0.41	0.47*	0.05	Attorney for Environmental Resources, NGO
<b>Factor D: A successful CBNRM programme draws upon external experts and knowledge</b>							
15	M. K.	Randolph, NH, USA	0.46	-0.01	0.00	0.51*	Member Forest Commission
23	R. P.	Oaxaca, Mexico	-0.06	0.20	-0.15	0.58*	Member of Eco-tourism Board
25	J. P.	Oaxaca, Mexico	0.00	-0.06	0.19	0.67*	Local Green-certified Furniture Factory Manager
<b>Non-significant loading</b>							
20	S. S.	Apuseni, Romania	0.25	0.20	-0.26	-0.35	Village Mayor

\*Indicates a defining sort

**Table 4**  
**Factor ranking of Q-sort statements and consensus/concurrence statements †**

	Q-Statements	Factor Rankings				Consensus or General Concurrence †
		A	B	C	D	
1	It is important to involve all identifiable stakeholders (such as local population, local government, region/state agencies, NGOs, research institutes) in developing a strategy for the conservation and management of the natural resources.	1	3	-1	0	
2	It is critical to take a concerted pro-active approach to community participation in natural resource conservation and management.	3	-1	0	0	
3	In order for natural resources to be managed more effectively and utilised more sustainably it is critical to have local participation and ownership or control at the grassroots level.	1	2	1	1	***
4	Partnerships are important to harness and focus a diversity of resources and leverage the public and political support necessary to address complex natural resource issues.	2	2	-1	-2	
5	There is a positive role for experts as facilitators and catalysts in the change process	-1	-2	-2	3	
6	Alternative economic opportunities need to be found for individuals negatively affected by natural resource use restrictions if these initiatives are to be effective.	-2	2	-2	1	
7	It is important that the process of organising a programme focuses on defining rules and norms for equitable resource use.	-1	0	1	2	
8	In order for local people to support the conservation of natural resources it is important for them to have ownership of the resources and be convinced of the benefits that the conservation will bring to them.	2	3	2	0	
9	Sustainable development opportunities, those that balance ecological concerns with issues of economics, will only be successful if they are sustainable financially.	0	2	1	1	**
10	To be economically sustainable, there is a need to shift from a subsidised model to a self-financing business model.	0	1	-1	-2	
11	It is important to provide information that affords residents the opportunity to learn or discover the connection between human activities and environmental quality.	1	1	-1	-2	
12	Communication and disseminated information should be provided to raise the level of community awareness of local environmental conditions.	1	0	0	1	***
13	An effective information system needs to exist for communicating and sharing a wide range of information among all stakeholders.	1	1	-2	2	
14	It is important to set up and operate internal research programmes.	-3	-3	2	0	
15	It is important to incorporate traditional knowledge with scientific research.	-1	-1	2	-2	
16	Decision makers should be provided with a solid scientific basis for making their decisions.	0	-1	-2	2	
17	The community should assist in the collection of environmental data needed for the management of the natural resource(s).	-1	-3	0	1	
18	It is important that local people have a good understanding of resource dynamics (for example, soil dynamics, nutrient flows, water cycles).	-2	-2	2	-3	
19	Purely local solutions may be more effective with a coordinated strategy at higher governmental levels.	0	-2	-3	0	
20	Effective community-based efforts need to have a well-developed and comprehensive set of rules and procedures.	0	0	3	2	
21	It is important to have national legal recognition and support for rules and regulations that provide for local control and ownership of natural resources.	-2	-1	1	1	
22	Successful initiatives need to be inclusive, open, and transparent.	2	2	0	-1	
23	Programmes should be structured to prevent corruption or conflicts of interests.	-2	0	0	-2	**
24	Capacity building workshops are needed to strengthen the organisation and increase participation, motivation, and trust among stakeholders.	-1	-1	0	-1	***
25	Successful programmes should have participatory monitoring and evaluation systems involving all stakeholders.	0	0	1	2	**
26	The community should pledge to monitor and implement the regulations they have developed.	-2	1	1	-1	

**Table 4**  
*Contd..*

	Q-Statements	Factor Rankings				Consensus or General Concurrence †
27	Strong adaptive management systems are critical to effectively and sustainably managing local natural resources.	-1	-1	-1	0	***
28	It is important that local community leaders are provided the tools and skills to 'take-over' the evolution of the programme.	0	1	2	3	
29	Direct input of community values and knowledge into decision-making processes is essential to achieve effective and responsive natural resource management.	3	0	3	1	
30	Policy making needs to include the public and other constituency groups.	1	1	-3	-1	
31	Strong NGOs (non-profits) with a proven track record in promoting community-based natural resource management are a critical resource for starting a new programme.	1	0	0	0	***
32	The public recognition of the declining quality of a natural resource is an important incentive for establishing a community-based environmental organisation.	-1	0	1	-1	**
33	It is useful to get an early start by initiating activities that bring people together.	2	-2	0	-1	
34	It is important to hold workshops that integrate and unify the many competitive and conflicting objectives, roles, and responsibilities of the different stakeholders.	0	-1	-2	-1	**
35	It is helpful to use conflict resolution specialists to resolve disagreements.	-3	-2	-1	-3	**
36	Active participation and collaboration of local communities closest to the resource is important to reduce internal conflicts between competing interests.	2	1	-1	0	

† Note: Full Consensus Statements (\*\*\*) are those statements shared by all four factors and are within a spread of one factor ranking. General Concurrence Statements (\*\*) are those statements shared by all four factors and are between one to two factor rankings.

recognised by these individuals as integral to success (4). External partnerships should harness a diversity of resources, and leverage additional support in order to address complex natural resource issues. Internal partnerships should include the collaboration of local communities closest to the resource, in order to build trust and reduce internal conflicts amongst competing interests (36). The 11 individuals who were associated with this perspective were all from the Randolph Community Forest site. The culture of this rural New England region includes independence, strong local control, and participatory democracy through the town meeting form of governance. This perspective is consistent with a rural community that embraces both self-reliance and participatory decision-making.

**Perspective B: A Successful CBNRM Programme Focuses on Ownership and Economic Concerns**

Core to this factor is the importance of identifying alternative economic opportunities for those adversely affected by the placing of restrictions on the extraction of natural resources (6). These individuals strongly embrace balancing ecological concerns with issues of economics, and stress the importance of being sustainable financially (9). One of highest values of this perspective is the community's ownership of the natural resources and the benefits that will result (8).

Similar to factor A, partnerships are also recognised by participants of this perspective as integral to success (4), control at the grassroots level was perceived as 'most important' for sustainably managing natural resources (3), and successful

**Table 5**  
*Factor correlations with Varimax rotation*

Factor	A	B	C	D
A	1.00	0.42	0.07	0.11
B	0.42	1.00	-0.11	0.10
C	0.07	-0.11	1.00	0.09
D	0.11	0.10	0.09	1.00
Composite reliability	0.978	0.973	0.960	0.923
Standard errors of factor scales	0.149	0.164	0.200	0.277

initiatives need to be inclusive, open and transparent (22).

However, these individuals appear to support a more traditional decision-making hierarchy than those of the other three perspectives. They support involving all identifiable stakeholders (such as the local population, local government, region/state agencies, NGOs, and research institutes) in developing a strategy for conservation and management of the natural resources (1) but, unlike the other perspectives, they do not perceive direct community input as essential for the decision-making process (29).

Of the nine individuals who significantly loaded on this factor, three are from the Randolph Community Forest site and six are from the Apuseni Natural Park site. No individuals from the Ixtlán de Juárez Communal Forest site loaded on this factor. This sensitivity to ownership and economic concerns is consistent with the interviews I conducted in Romania. One of the top priorities the participants identified for the Apuseni Natural Park was to 'develop alternative economic activities, to replace an economy based on forest exploitation that supports the local population'.

### **Perspective C: A Successful CBNRM Programme Enhances Local Knowledge and Understanding**

This group highly values direct input of community knowledge and values in decision-making, and sees this as essential to effective and responsive natural resource management (29) (similar to perspective A). However, this factor uniquely gives high priority to the critical role of increasing local knowledge and understanding local ecosystems. Characteristics which differentiate this perspective include the importance of setting up and operating internal research programmes (14), raising the knowledge of local people so that they have a good understanding of resource dynamics (18), and incorporating traditional knowledge with scientific research (15).

It emphasises the importance of building local capacity by providing local community leaders with the tools and skills to 'take-over' the programme (28), and supports having a well-developed and comprehensive set of rules and procedures (20), similar to perspective D. In keeping with the focus of local knowledge and ownership (8), they are hesitant to involve 'other constituency groups' in policy-making (30). They also do not recognise a need for involving higher government levels in their local work (19).

The 6 individuals that weighted significantly on this factor, were all from the Ixtlán de Juárez Communal Forest site. The hesitance of this group to cooperate with higher levels of government may be, in part, related to a long historic period of conflicts between the Zapotec indigenous community and the national government.

### **Perspective D: A Successful CBNRM Programme Draws Upon External Experts and Knowledge**

Factor D has a strong focus on the role of technical and organisational experts along with the need for the establishment of formal organisational systems. The highest priority for those from this perspective is the positive role for experts as facilitators and catalysts in the organisational changes processes (5) which was not valued by the other three perspectives. Decision makers should be provided solid scientific information (16) and the tools and skills to take over the management of CBNRM programmes (28).

This perspective stresses the importance of developing and codifying effective organisational systems. These include defining rules and norms for equitable resource use (7), a well-developed and comprehensive set of rules and procedures (20), and participatory monitoring and evaluation systems (25). This group also highly values the development of effective information systems for communicating and sharing information (13).

Consistent with the expert-driven paradigm of this group, local capacity building of local residents was not a high priority for individuals of this perspective. The least important priority of this group is raising the level of understanding of resource dynamics such as water cycles, nutrient flows, and soil dynamics by local people (18). They also seem to value

neither the importance of affording residents the opportunity to learn or discover the connection between human activities and the environment (11), nor the importance of incorporating traditional knowledge with scientific research (15). Unlike A and B they did not identify the role of partnerships for leveraging public and political support as important (4).

This group had the fewest members, with only three individuals who weighted significantly on this factor (one from the Randolph Community Forest site and two from the Ixtlán de Juárez Communal Forest site).

### **Areas of Consensus and Concurrence between Perspectives**

All of the four identified unique perspectives share identical or similar ratings on 11 of the 36 Q-statements (Table 6). These are either full consensus (within a spread of one factor rankings), or full concurrence (with a spread of two factor rankings).

### **Common Views: Review of Factor Rankings**

The final lens for reviewing the findings is to examine all statements that were ranked across all four perspectives from 0 to +3 (neutral to most important) or ranked 0 to -3 (neutral to least important). This will provide an insight into the common views from all three sites/cultures of the most and least important characteristics on successful CBNRM programmes.

#### ***Towards the most important characteristics (All perspectives and all sites)***

Nine shared statements were ranked from 'somewhat important' to 'most important' by all four perspectives across all three sites. These could be considered foundational to successful forestry community-based programmes. They include: the importance of local engagement and ownership (3, 8), financial sustainability (9), effective communication and dissemination of information (12), appropriate rules and procedures (20), participatory evaluation and monitoring systems (25), local capacity building to 'take over' the programme (28), direct community input into decision-making (29), and support from knowledgeable NGOs (31).

#### ***Towards the least important characteristics (All perspectives and all sites)***

Six statements were ranked from 'somewhat important' to 'least important' by all four perspectives across all three sites. These less important characteristics of a successful programme include: coordination with high government levels (19), structuring to prevent corruption or conflicts of interest (23), capacity building and other types of workshops (24, 34), strong adaptive management systems (27), and use of conflict resolution specialists (35). None of these characteristics were viewed by the stakeholders of these three forestry sites as essential to the success of their programme.

**Table 6**  
*Full consensus and full concurrence statements*

<b>More important statements</b>
3. In order for natural resources to be managed more effectively and utilised more sustainably it is critical to have local participation and ownership or control at the grassroots level. (Factor ranking: 1 to 2)***
9. Sustainable development opportunities, those that balance ecological concerns with issues of economics, will only be successful if they are sustainable financially. (Factor ranking: 0 to 2)**
25. Successful programs should have participatory monitoring and evaluation systems involving all stakeholders. (Factor ranking: 0 to 2)**
<b>Somewhat important statements</b>
12. Communication and disseminated information should be provided to raise the level of community awareness of local environmental conditions. (Factor ranking: 0 to 1)***
31. Strong NGOs (non-profits) with a proven track record in promoting community-based natural resource management are a critical resource for starting a new program. (Factor ranking: 0 to 1)***
32. The public recognition of the declining quality of a natural resource is an important incentive for establishing a community-based environmental organization. (Factor ranking: -1 to 1)**
<b>Less important statements</b>
23. Programs should be structured to prevent corruption or conflicts of interests. (Factor ranking:-2 to 0)**
24. Capacity building workshops are needed to strengthen the organization and increase participation, motivation, and trust among stakeholders. (Factor ranking: 0 to -1)***
27. Strong adaptive management systems are critical to effectively and sustainably managing local natural resources. (Factor ranking: 0 to -1)***
34. It is important to hold workshops that integrate and unify the many competitive and conflicting objectives, roles, and responsibilities of the different stakeholders. (Factor ranking: -2 to 0)**
35. It is helpful to use conflict resolution specialists to resolve disagreements. (Factor ranking: -3 to -1)**

\*\*\*Full Consensus Statements are those statements shared by all four factors and are within a spread of one factor ranking, \*\* Full Concurrence Statements are those statements shared by all four factors and are between one to two factor rankings

## DISCUSSION

The first aim of this research was to reveal the perspectives of participants from different cultures and international sites on the characteristics that are the most important and the least important for a successful sustainable CBNRM programme. Four unique perspectives were identified and described, each offering a unique view on what is the most important and the least important for a successful community-based forestry programme. The findings also revealed that there is a primary association of each perspective to one site/culture (except perspective D). This raises the question as to why there is a strong association of culture/site to an identified perspective.

Reviewing site visit observations and notes, I observed the presence of strong local group norms and organisational cultures, as well as overall positive relationships between the participants at each of the sites.

A future research question that this observation raises is: 'Are shared values a necessary pre-condition of a successful and sustainable community-based programme, or do successful programmes result in a convergence of values and development of group norms?' In addition, neither did I observe, nor was I informed of any significant conflicts at these sites. This is consistent with all four identified perspectives rating as very low the need for external conflict resolution assistance.

The findings support the supposition that a successful and sustainable forestry-based CBNRM programme is achieved, at least in part, through building a shared value system that

transcends the specific societal roles of the participants. For example, the manager develops a similar understanding of what is needed for success at their site, as does the environmental NGO director, and the local forester. The result is that when participants from one site are asked to independently rank 36 statements on CBNRM, the common knowledge and shared values that have evolved together through the participatory organisational structure likely influences their responses.

Each of the case study sites developed their community-based conservation programmes within a unique existing economic and cultural context. Post-communist Romania is considered a transitional economy that was experiencing annual GDP growth rates of over 6% prior to the 2009 recession. This culture was still in the process of shifting from a highly centralised political and economic system to local elected leaders and a fast growing private sector. The local conditions at the Apuseni Natural Park site included a broadening of the local economy from raw forest product extraction to include tourism and micro-enterprises. The general population, that was fairly well educated, had a significant distrust of the central government. The Randolph Community Forest site, however, is located in a fully developed economy. This region has a long history and tradition of local self rule as expressed in the state-wide motto 'Live free or die'. The population is fairly affluent and highly educated. In contrast, the Ixtlán de Juárez Communal Forest site is located in a fairly poor economic region of Oaxaca, Mexico in a developing economy. There is a long historical record of exploitative practices by the national

government of the indigenous Zapotec community along with previous political unrest in the region. The formal education level is fairly low. Each of these sites expressed a different balance between: conservation and development; community knowledge/capacity and use of external experts; and the determination of the appropriate level of sustainable use. These unique sites were chosen for this study, in part, due to this wide range of historical, economic, social, and political conditions. It is possible that these site-specific factors contributed to the primary association of three out of the four perspectives to one culture/site.

In addition to the four unique perspectives, there was broad agreement on 11 out of the 36 Q-sort statements. This broad level of agreement across all three cultures/sites transcended the unique cultural, economic, and ecological site-specific conditions. Both the unique perspectives and the commonalities are important to understanding how to achieve success in CBNRM programmes.

The four perspectives can be viewed as a Venn diagram with overlapping circles, illustrating both the unique characteristics of each of the four perspectives and the commonalities (Figure 3). Table 6 illustrates the 11 Q-statements (or areas) of commonality across all cultures/sites. Core to the full consensus statements was the importance of having local participation and ownership or control at the grassroots level in order to effectively and sustainably manage natural resources (3). This Q-statement received broad support by the participants and appears central to successful CBNRM initiatives. Least important across all perspectives was the need for conflict resolution specialists (35). There are also five Q-statements common to all but one perspective.

### Community Capital

The four identified perspectives can be interpreted through the lens of community capacity or a community capital. Community capacity is a very broad term with multiple definitions. Beckley *et al.* (2008) provide a definition of community capacity as “the collective ability of a group to combine various forms of capital within institutional and relational contexts to produce desired results or outcomes.” Numerous types of capital have been defined, including social, economic, and human. These are needed to sustainably manage a fourth form of community capital: natural capital.

Findings from each of the three case studies support previous research that community-based conservation programme can enhance community capacity or community capital (Rechlin & Taylor 2008). This growth in community capacity allows these local communities to have greater control of their future destiny. There is also the equally significant concern (Rechlin & Taylor 2008) that the “lack of developed community capacity can lead to conservation failure due to the inability of communities to hold up their part of the conservation bargain”. If we examine the four identified perspectives, each can be reasonably associated with one of the three aforementioned forms of community capital.

### Social capital

Perspective A (A Successful CBNRM Programme Builds Social Capital Including Partnerships) is clearly associated with internal bonding, and bridging social capital within the community, and external linking of social capital, or partnerships between this and other communities. Social capital has been referred to as “any value added to the activities and economic outputs of an organisation by human relationships, partnerships and cooperation” (Forum for the Future 2009). Social capital has also been understood as including social norms, trust, and networks (Putnam *et al.* 2003). Perspective A clearly embraces the role of social capital in a successful programme. For instance, in the Randolph Community Forest site, a number of community members stated that community gatherings were vital to their success at building consensus.

### Economic capital

Economic capital includes physical capital and financial capital. Perspective B (A Successful CBNRM Programme Focuses on Ownership and Economic Concerns) refers to the importance of an alternative, economic capital base to replace the previous non-sustainable forest harvesting practices. For example, in the Ixtlán de Juárez Communal Forest site, a major physical capital investment was made in a green-certified furniture factory in order to make and sell value-added forestry-based products. In the Apuseni Natural Park site, significant investments in tourist centres and tourist lodges were made to transition the economy from one solely based on raw or primary forest products to a broader economic base.

### Human Capital - Local/indigenous

Most closely associated with this form of human capital is Perspective C (A Successful CBNRM Programme Enhances Local Knowledge and Understanding). Human capital typically refers to people’s knowledge, education, skills, job experience, health, and motivation (Forum for the Future 2009). This capacity is acquired through formal and informal education and training. For example, raising the level of knowledge and skills of the members of the Ixtlán de Juárez Communal Forest site was cited by numerous individuals as critical for building their successful programme.

### Human Capital - Expert/external

Another dimension of human capital, that can complement what is traditionally acquired through formal and informal education, includes business entrepreneurship, life experience, and leadership (Beckley *et al.* 2008). Perspective D (A Successful CBNRM Programme Draws upon External Experts and Knowledge) describes the need for technical and organisational/business experts. This, I will refer to as ‘expert/external human capital’ since these individuals are typically brought in from outside the region/site. For example, professional foresters were cited as instrumental in developing a sustainable forestry management plan in the Randolph Community Forest site.

## Mobilising Community Capital

Figure 4 provides a visual model of community capital (social, economic, and human) that is embedded in the ecological or natural capital system. In this model, the local/indigenous and expert/external forms of human capital are both included under human capital. Initially, prior to the establishment of a community-based programme, some sites are likely to have some forms of community capital higher than other forms. This research found that successful programmes appear to have developed the requisite leadership skills to grow one or more forms of community capital, particularly in areas of need.

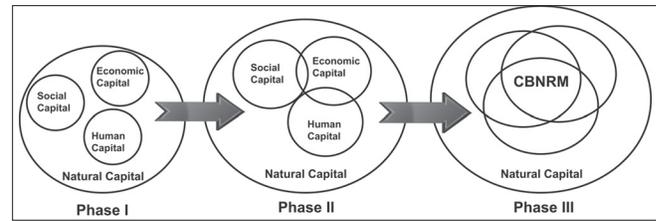
This conceptual model illustrates that for a CBNRM programme to be successful, over time there needs to be a progressive development of social, economic, and human capital, and the integration of these forms of capital into a community-based programme. The effective and coordinated use of these forms of capital will first stabilise and then reverse a drawdown (or deterioration) of natural capital that will eventually lead to sustainable use of natural resources. Observations at all three sites are consistent with this model.

For example, in the Ixtlán de Juárez Communal Forest site, the recent growth in economic capital (new green-certified wood used in their furniture factory, tree nursery, and tourist facilities) was cited as instrumental to their success. Participants also shared during interviews (and in their responses to the Q-sort) their embracing of the need and value of raising the level of knowledge and skills of their community members. In the Apuseni Natural Park site, the growth of economic capital through the development of micro-enterprises and tourism facilities, and the growth of social capital through new dynamic networks and working groups, was shared as seminal to their success. In the Randolph Community Forest site, numerous participants cited the high level of local networking and relationships (social capital) as a primary reason for their success.

Based on this model of building community capital, a key question to be asked by those wishing to support a new programme is: 'What is the current condition of each of these three forms of capital, and what type of support is needed to grow them, in order to sustainably manage and grow the local natural capital?' A follow-up question is: 'How do these four perspectives inform us about the type of leadership that is needed to grow these forms of community capital?'

## CONCLUSION

The four perspectives revealed in this research on what is needed for a successful CBNRM programme may be helpful for others in pre-programme site assessment, strategic planning, and working with the public and a wide range of stakeholder groups involved in sustainably protecting their ecological commons. Q-sort methodology is a practical and useful research tool that can assist in these types of efforts by revealing hidden values and perspectives of those involved in these community-based efforts.



**Figure 4**  
*Conceptual model of growth and integration of capital for supporting CBNRM programmes*

We must be diligent in our research to better understand the organisational principles and characteristics that are essential for achieving effective and sustainable CBNRM programmes. It is hoped that the findings from this research will increase this understanding. Although all cultures/sites that establish these programmes are unique, there are certain common principles that appear to transcend cultures and apply to nearly all situations. An awareness of these principles can be helpful. It also appears that the identification of the relative strengths and weaknesses of various forms of community capital can be instrumental in directing efforts to improve or develop CBNRM programmes.

## ACKNOWLEDGEMENTS

I acknowledge and thank T. Legovic, R. Bošković Institute; University of Zagreb; J. Atwood, M. Cadot, J. Nelson, and J. Fiderio of Antioch University New England; T. Webler, SERI; IUCN - Council for Environmental, Economic, and Social Policy (CEESP), and P. Stoddard for their helpful comments and editorial assistance. For site assistance, I thank G. Parauan, Romania; F. Reyes Cervantes, Mexico; and D. Willcox, USA.

## Notes

1. Q-sort is a research approach that focuses on the subjective dimension of an issue that contains numerous points-of-view or perspectives. Q-methodology seeks to identify correlations between subjects across a sample of variables that reflect the full range of points-of-view. This is achieved by acquiring data through a number of individual Q-sorts where subjects rank statements. The data is then analysed using multi-variable factor analysis. The results provide an insight into shared perspectives and values.
2. 'Transitional economy' typically refers to the post-1990 economies of Eastern/Central Europe during their transition from communist to capitalist economic/political systems.
3. The detailed selection process is described in this previously published research paper.
4. The selection process for these 24 case studies and the identification of each site is described by Gruber (2010).
5. Although every major stakeholder group was included, and efforts were made to include a broad cross-section of all stakeholders, it is likely that some stakeholder groups may have been missed.
6. This software was originally adapted from the Mainframe Fortran version written by J. Atkinson.
7. Varimax rotates factors in order to increase the association of each individual with only one factor, minimising individuals associated with more than one factor. Multiple Varimax rotations on the data were

completed using 2 to 8 potential factors.

8. The criteria used included:
  - i. *Overall Clarity*: Maximising the number of Q-sorts (individuals) that significantly load on only one factor, minimising the number of confounded sorts (those loading on more than one factor), and minimising the number of non-significant (non-loading) Q-sorts;
  - ii. *Simplicity*: Minimising the total number of factors without losing significant information or the total number of Q-sorts that significantly load on a factor. The number of factors is minimised when additional factors only produce bi-polar splits of existing factors;
  - iii. *Threshold Requirements*: Requiring that all factors exhibit an Eigen value greater than unity and at least two statistically significant Q-sorts load on each factor;
  - iv. *Stability*: The overall factor solution is considered stable when similar individuals tend to cluster together during the process of comparing multiple analyses using different numbers of factors;
  - v. *Distinctness*: Minimising correlation between factors and maximising distinguishing statements for each factor;
  - vi. *Total Variance Explained*: Seeking to maximise the total variance that is explained by the factors that were selected.
9. The pre-flagging algorithm of PQMethod is designed to flag 'pure' cases only, according to the rule: Flag loading if factor 'explains' more than half of the common variance and the loading is 'significant at  $P > 0.05$ ' (PQMethod documentation).

## REFERENCES

- Addams, H. & J. Proops. 2000. *Social discourse and environmental policy: An application of Q methodology*. Northampton, MA: Edward Elgar Publishing, Inc.
- Agrawal, A. & C. Gibson. 1999. Enchantment and disenchantment: The role of the community in natural resource conservation. *World Development* 27: 629–649.
- Armitage, D. 2005. Adaptive capacity and community-based natural resource management. *Environmental Management* 35: 703–715.
- Barry J. & J. Proops. 1999. Seeking sustainability discourses with Q methodology. *Ecological Economics* 28(3): 337–345.
- Beckley, T.M., D. Martz, S. Nadeau, E. Wall and B. Reimer. 2008. Multiple capacities, multiple outcomes: Delving deeper into the meaning of community capacity. *Journal of Rural and Community Development* 3(3): 56–75.
- Borrini-Feyerabend, G., M. Pimbert, M.T. Farvar, A. Kothari and Y. Renard. 2004. *Sharing power: Learning-by-doing in co-management of natural resources throughout the world*. Tehran: IIED and IUCN. CEESP/CMWG.
- Brewerton P. and L. Millward. 2001. *Organisational research methods*. London: Sage Publications.
- Brosius, J.P., A. Tsing, A. Lowenhaupt and C. Zerner. 1998. Representing communities: Histories and politics of community-based natural resource management. *Society and Natural Resources* 11(2): 157–168.
- Brown, J., N. Mitchell and M. Beresford. (eds.). 2005. *The protected landscape approach: Linking nature, culture, and community*. Gland, and Cambridge: IUCN-The World Conservation Union.
- Brown, S.R. 1980. *Political subjectivity: Applications of Q methodology in political science*. New Haven, CT: Yale University Press. Available at <http://reserves.library.kent.edu>.
- Brown, S.R. 1986. Q technique and method: Principles and procedures. In: *New tools for social scientists: Advances and applications in research methods* (eds. Berry, W.D. & M.S. Lewis-Beck). Pp. 57–76. Beverly Hills, CA: Sage Publications.
- Clubul Ecologic Transilvania. 2005. 2005 Annual report. <http://www.cetcluj.ro/> Accessed on February 25, 2009.
- Child, B. 2007. Lessons, experiences, and critical conditions for CBNRM: Can communities conservation bring international goals down to earth? Chairman's report from a workshop on the ecosystem assessment. Copenhagen: Nordic Council of Ministers.
- Child, B. and M. Lyman. (eds.). 2005. *Natural resources as community assets*. Madison, WI: Sand County Foundation and The Aspen Institute.
- Forum for the Future. 2009. Forum for the future: Action for a sustainable world: The Five Capitals Model. [www.forumforthefuture.org/our-approach/tools-and-methodologies/5capitals](http://www.forumforthefuture.org/our-approach/tools-and-methodologies/5capitals). Accessed on February 23, 2009.
- Gruber, J.S. 2010. Key principles of community-based natural resource management: A synthesis and interpretation of identified effective approaches for managing the commons. *Environmental Management* 45: 52–66.
- Hackert C. and G. Braehler. 2007. FlashQ software. Available at: <http://www.hackert.biz/flashq/home/>. Accessed on February 23, 2009.
- Leach, M., R. Mearns and I. Scoones. 1999. Environmental entitlements: Dynamics and institutions in community-based natural resource management. *World Development* 27: 225–247.
- Millennium Ecosystem Assessment. 2006. *Statement of the MA Board: Living beyond our means: Natural assets and human well-being*. Washington, DC: Island Press.
- Putnam, R.D., L.M. Feldstein and D. Cohen. 2003. *Better together: Restoring the American community*. New York, NY: Simon and Schuster.
- Rechlin, M. and D. Taylor. 2008. Community-based conservation: Is it more effective, efficient, and sustainable? Report to The Gordon and Betty Moore Foundation. Submitted by Future Generations Graduate School of Applied Community Change and Conservation.
- Stephenson, W. 1935. Correlating persons instead of tests. *Character and Personality* 4: 17–24.
- Webler, T., S. Danielson and S. Tuler. 2009. *Using Q method to reveal social perspectives in environmental research*. Social and Environmental Research Institute. Greenfield, MA. [www.seri-us.org/pubs/Qprimer.pdf](http://www.seri-us.org/pubs/Qprimer.pdf). Accessed on May 2, 2009.
- Webler, T., S. Tuler and R. Krueger. 2001. What is a good public participation process?: Five perspectives from the public. *Environmental Management* 27: 435–450.
- World Bank. 1998. Conference proceedings: International workshop on community-based natural resource management. Washington, DC: World Bank.
- World Resources Institute. 2005. Navigating the numbers: Greenhouse gas data and international climate policy. [http://pdf.wri.org/navigating\\_numbers.pdf](http://pdf.wri.org/navigating_numbers.pdf). Accessed on June 7, 2010.