

LEARNING FROM THEORIES AND PRACTICE OF SUSTAINABILITY:
IN SEARCH OF COHESION

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ABSTRACT

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This dissertation began from the general question: what is sustainability? This complex question was addressed in three separate papers. Sustainability, generally, is commonly thought to have emerged from the conceptualization of sustainable development, especially after the Brundtland Report thrust the topic into the world political arena and raised research interest in the topic. The first paper traces the evolution of development theory in the move to sustainable development. The second paper reviews the construction of sustainability in the fields of agriculture, development and business and provides an analysis of whether and how these different constructions have contributed to a common understanding of sustainability. The analysis leads to conclusions about the role of values in motivations for implementing sustainability practices and the evidence for a set of minimum standards that such practices should meet. Finally, the third paper looks at whether efforts to implement sustainability on the ground follow from what academics are offering. Many communities are working on measuring their progress toward sustainability using sustainability indicators. An analysis of sustainability indicators reported by 20 communities across the U.S. is conducted using an analytical framework that evaluates indicators according to type, values-orientation, and the dimension of sustainability addressed. The results suggest some important differences between communities' interpretations of sustainability and theoreticians' interpretations in the literature.

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To my wife Julia and my boy Nico
To my parents

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PREFACE

Work on this dissertation began from the general question: what is sustainability? The motivation came from ongoing discussions about sustainability in my academic department before it became the Department of Community Sustainability, from the experience on sustainable agriculture I got at EARTH University during my undergraduate education, and finally from my masters program in which I conducted research in natural resource and environmental economics. All of these experiences gave me a broad perspective on the multiple approaches to sustainability. Because the topic is very complex, this dissertation was framed to answer the question by addressing three research areas.

First, it is known that all across the United States of America there are several communities organizing community sustainability efforts and reporting community sustainability indicators. One wonders, what do these groups think sustainability is? And how does what they do compare to what is in the literature about sustainability?

Second, what is exactly in the literature about sustainability? Many, as I myself did, believe that sustainability emerged from the field of sustainable development. Therefore I made a deep exploration of the origins of this concept. I made a survey and synthesis of the literature to explore how development theory evolved into sustainable development.

Third, even though I started reviewing only the sustainable development literature, during this process I realized the existence of two other simultaneous constructions of sustainability within

the fields of agriculture and business. However, these three fields differ in their interpretations of sustainability. In response, I propose to create cohesion of knowledge for the benefit of implementation.

This dissertation is organized as follows:

Chapter 1 discusses how sustainability is commonly thought to have emerged from the conceptualization of sustainable development (SD), not only because of the large size of the literature addressing SD and discussing the meanings of sustainability, but also because of the greater recognition that sustainability gained after the publication of the Brundtland Report (WCED 1987). The Brundtland Report helped put the topic in the world political arena and also raised research interest in the topic. The first paper of this dissertation explores the evolution of development theory in the move to SD through three questions:

- i) How did the foundational development theories contribute to the emergence of SD?
- ii) What are the disciplinary contributions to SD and their implications for implementation of SD?
- iii) Have there been theoretical and methodological advances with the focus on SD?

Even though SD has contributed significantly to the body of literature addressing sustainability, other fields of knowledge have addressed sustainability in their own terms. Chapter 2 of this dissertation describes the construction of sustainability in the fields of agriculture, development and business. The chapter analyzes their origins to contrast their fundamental differences or similarities, in search of contributions to or impediments for implementation. This chapter has four key objectives:

- i) Explore different ways of understanding sustainability,

- ii) Offer a critique of making sustainability decisions based upon only one way of understanding sustainability,
- iii) Propose that a value-based criterion is required for a common understanding of sustainability, and
- iv) Recommend a set of minimum standards that could reconcile actions reflecting diverse perspectives on sustainability.

The third chapter looks at whether efforts to implement sustainability on the ground follow from what academics are offering. Many communities are working on measuring their movement to sustainability trends using sustainability indicators; this work may provide insights into whether sustainability in the literature is translating into sustainability in practice. An analysis of sustainability indicators reported by 20 communities across U.S. is conducted to address three questions:

- i) What types of community sustainability indicators are found across community sustainability efforts?
- ii) Based on communities' visions of progress and associated indicators, what constitutes sustainability for them?
- iii) How do communities' interpretations of sustainability compare to those from theoreticians' interpretations in the literature?

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CHAPTER 1- From Modernization to Sustainable Development: Evolution of Theory and Methods of Development

A. Introduction

The quest to explain and guide social change in the Western tradition can be traced back to the works of renowned philosopher Max Weber (1864-1920) or Émile Durkheim, the father of sociology (1858-1917). However, the theory and methods of development are a phenomenon of the twentieth century, because the urge to understand social change in the context of development only advanced when it became prominent in world politics during the reconstruction of European nations after the second world war (Sachs 1992). After this time, the concept was extended as a strategy for worldwide poverty alleviation and gained greater recognition. Today the literature covering development topics is extensive, with many diverse theories branching out from the postwar theoretical strands.

In the last four decades the theory and methods of development have undergone tremendous change due to intense criticism. On the theoretical side development has been criticized on philosophical grounds. On the empirical side development is criticized for failing to effectively guide progress because of its meager record of accomplishments (Frank 1980, Apter 1987). For some of these critics, the development enterprise in which academics, practitioners and policy makers have engaged so enthusiastically is viewed as pointless and laying “in ruins” on the intellectual landscape (Sachs 1992). Others, however, propose a post-development enterprise that examines alternative types of development to explain human progress and argue that rejecting theories altogether is not necessarily the best route for the continuation of the discipline (Escobar 1992). Still others argue that we have continuously abandoned useful ideas in favor of new ones,

rather than building on past positive and negative experiences, to create continuity and give more consistency to theory and practice (Chambers 2005).

While development then is, for some, in crisis, this paper sides with those arguing that this is simply a transitional period for the discipline. Despite some disillusionment and disappointment, the underlying objectives for development are still as valid and important as they were in the past (e.g., guidance for change); the ideas and related topics of development are a continuous intellectual process that embodies the rationality of growth (Apter 1987). The criticism expressed in the past highlighted theoretical and implementation shortcomings that were resolved in their own time, particularly in the period when the articulation of sustainable development (SD) took place. Moreover, the discipline is augmented with new ideas and prioritizations, thus is far from being an intellectual ruin; rather it has evolved and continues evolving.

Despite a vast development literature, little effort has been made to recast valuable foundations and evaluate them in the context of current thinking about sustainable development. That is the purpose of this paper. It will focus on salient works and key moments in the history of development theory in order to discern changes in the theory's philosophical foundations and consequent impacts at the implementation level. If development is in a transition, what should we expect development to become in the context of SD?

B. Foundational Development Theories

In this initial section, the concept of development is deconstructed to show how historical development theories triggered strong criticism and consequently halted implementation. For this, it is necessary to recast recent history going back to the post World War II (WWII) period,

during which reconstruction urgencies were resolved and development was redirected to poverty¹ relief, ending hunger, and creating better living conditions in poor nations around the world by replicating the experience of the industrialized nations. This emphasis provided the rationale for an intervention in poor nations and the application of modernization theory. The source of an impulse to implement such interventions is not necessarily clear. On the one hand, it was argued that simple morality (do the right thing) provided sufficient reason. However, others saw these actions as moral pragmatism in response to fears of the negative effects that social unrest and instability of a nation could bring to an entire region (Peet and Hartwick 1999). The latter motivation can be understood in the context of the post-WWII period in which the world was separated by capitalism and communism as dominant economic systems, both seeking to maintain or expand a hegemonic dominance.

1. Philosophical premise for development

The origins of development theories can be traced to the need to understand progressive social change associated with the betterment of societies. Early theories derive from the combination of naturalism and rationalism that were integrated into the sociological structural-functional approach proposed by Talcott Parsons (Peet 2009). Descarte's rationalism states that the capacity of humans to control the world happens through logic and reason, and that reason, as opposed to

¹ During the early period of development, poverty was seen as bad because of religious influences that deemed poverty the result of a refusal to work, and it was defined as the lack of means for the individual to satisfy basic needs of food, shelter, clothing and services. This early definition was based on external judgments of traditional societies and did not reflect later evidence that poverty was also the product of exploitation of non-industrialized nations by industrialized nations, power inequalities between nations, and the high concentration of wealth in industrialized nations (Sachs 1992)

religious beliefs, is the foundation on which the justification for all cognitive claims should rest (Dresner 2002). Naturalism is a sociological theory that draws on biology to argue that the world is ruled by natural laws and thus an understanding of reality should be based on those laws, as opposed to super-natural or superstitious beliefs. In sociology, use of the term naturalism validated sociology as a science in the same sense as the natural sciences, and with the methods of the natural sciences used by sociologists (experiment, inductive generalization, prediction, statistical analysis). Émile Durkheim advocated a methodology modeled upon that of the natural sciences (Scott and Marshall 2005).

2. **Structural Functionalism**

American Sociologist Talcott Parsons (1902-1979) introduced the structural-functional approach for the analysis of social systems in what is called the *positivist project* to re-launch sociology into a more properly scientific status² (Hughes and Sharrock 2007). The structural-functional theory postulates that society is a system of interdependent elements in equilibrium, that elements can and do adjust to each other; and the actions of the actors are oriented towards meeting the needs of the system. For Parsons, the social system “is a system of social interactions between reciprocally oriented actors. It consists of roles, collectivities, norms and values”. Functions are “sets of conditions both within and outside the system which set limits on the system variations that are compatible with its integrity and effectiveness”. The social structure is then “a stable social interaction of systems” with an equilibrium that depends on

² The motivating question was how to put sociology onto a scientific footing and turn it into a properly empirical discipline (Hughes and Sharrock 2007 p. 29).

“reciprocal orientation and consistency of the interests of actors as they are placed within a system of differentiated roles” (Segre 2012 pp 2-4).

Parson’s structural-functional approach was highly influential in sociological thinking during the middle of the twentieth century (Harrison 1988, Peet and Hartwick 1999, Segre 2012). His theories were first stated in the publication of “The Structure of Social Action” (Parsons 1937) and became a source of debate and criticism all the way through the publication of two other works by Parson: “The Social System” (Parsons 1951) and “Toward a General Theory of Action” (Parsons and Shils 1951). Although these later works sparked a greater debate, they also cemented the dominance of Parson’s theories in sociological studies (Segre 2012). In a more detailed conceptualization, the structural-functional approach focused on conditions of stability, integration, and role differentiation within the system, and effectiveness of the system. Society is viewed as a system of institutions that fulfills natural functions, where social control trumps individualism. The specialization of modern society’s social and economic roles (e.g., complex division of labor) creates dependencies that tie people together (Peet and Hartwick 1999).

The structural-functional approach, known in short as functionalism, was a dominant evolutionary theory supported mainly by *functionalists* who accepted that social change can occur in a linear direction and that some societies are more advanced than others (Hughes and Sharrock 2007). Because the instillation of politics into the debate over evolutionary theories was inevitable during the 1960s, due to Cold War tensions, the approach was seen as a sociological response to the conflict theory of change proposed by Karl Marx. Functionalism provided the ideological fundament to support the validity and superiority of capitalism as opposed to

communism. These sociological theories of change presented a sharp divide between functionalism and Marxism. Functionalism represented a world of stability and consensus; Marxism represented a world of conflict and change (Demerath III 1996).

3. **Traditional vs. Modern Societies**

Between the 1940s and 1950s, while functionalism was debated in the academic arena, interest in “developing” underdeveloped societies gave rise to new analytical approaches and new methodological tools of inquiry. These new methods became linked with some major theoretical developments in sociology and political science, in particular with the structural-functional approach (Eisenstadt 1974). This combination of methods and sociological theory gave rise to new approaches in comparative macro-societal analysis and to the analysis of social change, particularly focusing on a fuller elaboration of the structural characteristics of *traditional* vs. *modern* societies. According to Eisenstadt (1974), traditional societies were seen as very restricted and limited, “characterized by the predominance of particularistic, ascriptive, and diffuse (structural) patterns in contrast to the universalistic, specific, and achievement orientations of modern societies” (p 228). The notion of a traditional society was not developed further, but was applied generally to all societies deemed backward. Modern societies were seen as more expansive and able to cope with a wider range of external pressures and problems.

The move from a traditional to modern society was characterized by a high degree of differentiation of the major cultural elements and value systems. By implication, societies in the process of becoming modern were creating a system of elements that were relatively stable, integrated and serving a purpose. Drawing from the work of Eisenstadt (1970), the structural characteristics of modernization are discussed by Peet and Hartwick (2009 p 122): modern

societies' resources had to be available for free exchange rather than locked by common property structures; social identification should refer to national levels rather than local or ethnic; social actors should have highly specialized roles in the social and economic spheres; there should exist growing markets; and the social configuration should favor urbanization, mobility and the spread of education. For the political sphere this meant the spread of democracy and the weakening of traditional elites; in the cultural sphere this meant a differentiation between cultural and value systems, secularization, and the emergence of a new intellectual elite (artistic, social or political). These core elements, based on shared beliefs, norms, and values of a society, are the most resistant to change; thus for functionalists, change occurs in response to external factors (Poppenoe 1983). This justified the efforts of modern nations to press modernization on traditional societies.

C. Modernization Theory

During the 1960s nations were labeled as either centers of the modern world or those that were on the periphery and in a backward state. The type of development represented in modern countries was seen as the state to which backward countries should aspire. In other words, for a nation to be modern it must take on the characteristics of the industrial society. The growing interest of sociologists in practical matters (i.e., developing methods to test theories), the possibilities of bringing about change, and understanding the process in which societies emerge or fail to emerge from pre-modern conditions gave way to development of a paradigmatic framework of assumptions and concepts that served as the initial model of modernization.

1. Stages of Growth

In the early 1960s a mega-scale U.S. foreign policy effort took place in order to bring modernization to nations considered poor, or those labeled as third world nations³. The work of Walt W. Rostow, in *The Stages of Economic Growth: A Non-communist Manifesto* (Rostow 1960), was highly influential in shaping this U.S. international policy. This work gave modernization theory its most concrete and best-known form (Chirot and Hall 1982). In his work, Rostow argued the existence of five stages of progress through which nations could be transformed from traditional to modern.

- Traditional society (structure is developed within limited production opportunities)
- Preconditions to takeoff
- The takeoff
- The drive to maturity
- The age of high mass consumption

Rostow's stages of growth illustrated how progress should occur when a society moves from a lower stage, with limited production opportunities, to become a modern society in which consumption exceeds basic needs. At the fifth stage, the economy becomes oriented toward the service sector. "The stage-theory occupied a position of leadership in development thinking in

³ Wolf-Phillips (1987) developed a comprehensive discussion of development and authorship of the term "third world", identifying its origins in the writings of French demographer and economic historian Alfred Sauvy in publications from 1952. Third world was initially used as a label for those countries aligned (using political language) with neither the West (US and Western Europe), known as first world, nor the East (Soviet block), known as the second world. Later in development literature, the term was applied generally to poor nations in need of development aid, or so-called backward nations.

the 1960s when the new liberal attitudes toward the Third World were being established” (Peet and Hartwick 1999 p 129).

From the post WWII era until the late 1970s, development was explicitly a matter of building capital (in human, natural and technological resources), technological change (industrialization), and education aligned with ideas of modernization; and development occurred when the right decisions were made about how to combine these elements. Development was conceived as a strategy to improve the economic and social life of specific groups of people, the people from poor countries (Escobar 1992), based on the assumption that modern nations had it figured out.

2. Critics of Modernization

Modernization was faulted because of several of its assumptions. For instance, the emphasis of modernization on systemic differences between traditional and modern societies reflected a more refined definition of *modern*, whereas the definition of *traditional society* was less developed and assumed to be the same across all societies viewed as existing in an early stage. It was assumed, also, that once societies acquired all conditions for the takeoff stage, the diversity of traditional societies would disappear, as if traditional societies would become homogeneous in structural order and composition (i.e., social institutions)⁴. Further, in contradiction of the assumption that less *traditional* societies are more capable of moving up on the scale of modernization, it was found that traditional societies varied greatly in the degree to which their traditions hindered or

⁴ Rostow’s third stage is the “takeoff” in which traditional barriers to economic growth are overcome possibly through adoption of new technologies; investment increases rapidly and new industries expand, as does the entrepreneurial class. Agriculture is commercialized, with corresponding growth in productivity, a necessary development to meet the demand of urban centers (Harrison 1988).

facilitated the transition to modernity (Eisenstadt 1974). The destruction of traditional societies did not necessarily translate into better societies; oftentimes the disruption of traditional families, communities or political settings led to disorganization, delinquency and chaos rather than modern order.

Eisenstadt (1974) discussed two additional problematic assumptions. The first was the assumption that those interrelated institutional areas identified as necessary for development must evolve simultaneously. These covariant elements, in the language of modernization, included conditions of modern economic, political and cultural systems. The second assumption was that once the basic system is formed, the society will experience sustained irreversible growth and enhancement of the organizational structure. Rostow's stages of economic growth exemplify the use of these two assumptions.

In denying the importance of traditional elements and history of *traditional* societies, modernization was seen as ahistorical; however this is not a property of modernization theory alone. Pieterse (1991) discusses the work of Robert Nisbet (1969) in reference to theories of social evolution in which progress is seen as a biological metaphor and thus regarded as natural, imminent, linear, continuous, necessary, and conducive to an *imperial* panorama. People from the non-industrialized nations were dehistoricized, and progress would grant them history as long as they followed the path of evolution towards modernization. By extension, traditional knowledge was also dismissed in the process of modernization; thus, the knowledge, technology and pattern of social institutions required by modernization are those from modern nations. These ethnocentric attitudes were possibly a reflection of the cultural hegemony of the west over

the rest of the world. Considering that this was the time of the cold war, Pieterse (1991) went even further and argued that modernization was the means by which modern western nations could operationalize political containment of the proletarian revolution of the dispossessed. Or in the words of Slater (1993), the occidental deployment of modernization theory for developing countries reflected a will to amass geopolitical power. It can be understood that for this reason, across modernization literature of the post WWII period, there is scarce mention of democratization as a goal of modernization. Rather, modernization was equated with economic growth.

A key critique of modernism came from the writings of Michel Foucault (1926-1984). Peet and Hartwick (2009) described how this French philosopher directed attention to the epistemology of expert knowledge and questioned the validation procedures in which expert information is accepted as objectively true and therefore deemed serious, important, respectable and supportive of responsible action. For Foucault, this discourse was an excuse to claim truth to gain power. Particularly he referred to the community of experts in the social sciences, with western values that set up the rules for telling the truth as a mode of social control. Foucault saw modernity as a global theory that was reductionist, universalistic, coercive and even totalitarian (Peet and Hartwick 1999). Modernism was seen as the procedure to create a simple world by reducing the cultural, social, and architectural diversity found across nations and hindering humans' abilities and imagination to cope with progress (Sachs 1992).

This type of post-modern⁵ criticism created doubt about and a degree of rejection of modern development. The intent of the criticism was to change attitudes toward the assumption that development, as a normative stance, was good at the level of intuition. For the critics, what was assumed to be progressive, beneficial and humane was now seen as a controlling and often detrimental process (Sachs 1992; Peet and Hartwick 1999). The imposition of western values became a target of questioning; even *good* intentions were suspected. Questions were asked: Who determines what beneficial means? Beneficial for whom?

Peet and Hartwick (2009) described the emergence of *critical* modernism as an alternative whereby development theory would be transformed through criticism and a selective retention of elements of modernism. However, critical modernism remains modern in the sense that it still favors scientific evidence over beliefs and, even more, external scientific evidence over local beliefs. Thus, rather than offering a reformation of modernization, critical modernism reflected resistance to change. Two other alternative theories contributed more significantly to the evolution of development discourse

D. Alternatives to Modernization

1. Dependency Theory

Dependency theory was conceived by Latin American opponents of theories of modernization and its associated economic strategies for development. Raul Prebisch, the head of the United Nations Economic Commission for Latin America (ECLA) in the late 1940s and early 1950s, is

⁵ Simon (1997) explains how theoretical turns are characterized by the prefix post- as a way to signify differences, either in terms, period or conceptual and methodological approaches.

perhaps the father of dependency theory (Chirot and Hall 1982). Dependency theory derives from the Marxist critique of capitalism, and it focuses on the dichotomous relationship between the center and periphery, between development and underdevelopment, and between rich and poor countries. It pays particular attention to the international structure of development and underdevelopment⁶, regarding this dichotomy as a direct consequence of Western capitalistic expansion. The main contention of this theory is that underdevelopment can only be overcome by capitalism, but contradictorily underdevelopment occurs because as societies are incorporated into global capitalism, their development is blocked and even reversed (Eisenstadt 1974, Apter 1987, Harrison 1988, Pieterse 1991). This criticism describes conflicting intentions of development in the sense that the forces that made development possible in the already developed nations are, at the same time, hindering development in underdeveloped nations. As described by Eisenstadt (1974), Andre G. Frank articulated this criticism: “if the now underdeveloped were really to follow the stages of growth of the now developed ones, they would have to find still other peoples to exploit into underdevelopment, as the now developed countries did before them” (Frank, 1970 p 46).

The work of David Slater (cited by Peet and Hartwick 2009) served as an analytical platform on which the theory of dependency was presented as a rebuttal of modernization’s arguments for development. The principle argument put forth by Slater is that the western geopolitical

⁶ A body of literature describing underdevelopment theories responded to publication of dependency theory. This literature contains discussions of and debates over the reasons for underdevelopment of nations. Although important in creating awareness about these topics, it falls outside the main scope of this paper and therefore is not addressed directly. However, some of the main arguments from that literature are included in the critique of modernization.

imagination violated the rights of other societies to bring to bear their own principles of progress. In the view of this theory, developing nations were portrayed by modernization as passive recipients of external interventions.

Cardoso's (1977) discussion of dependency theory helped explain that rather than imposing external models of development on developing nations, it was necessary to hear what developing nations under the influence of modernization had to say about their own development ideas. His intention was to impact mainstream development thinking of those advocating for modernization in government agencies, international organizations and academic communities.

“The analyses of dependency situations in Latin America done in the second half of the sixties did not represent new methodological propositions. What happened was that a current which was already old in Latin American thought managed to make itself heard in the discussions that were taking place in institutions normally closed to it: Economic Commission for Latin America (ECLA), the universities, some government planning agencies, and – last but not least – the North American academic community” (Cardoso 1977 p 9)

Colombian anthropologist and dependency theorist Arturo Escobar (1992) expanded on the rejection of modernization by arguing that universal models – such as modernization – hindered people's capacities to create their own models of development. Escobar favored, instead, autonomous peasant development strategies that opened spaces for peasants to struggle, that saw peasants not in terms of limitations but possibilities, and that modified social relations of production. For Escobar (1992), development was a *constructed reality*, created by western views with the intention of dominance, an apparatus that colonized reality and became a

hegemonic discourse of imaginary progress in the form of power and intervention⁷. The result was the mapping and production of Third World societies. Escobar's core criticism was not about alternative development theories or modifications to the dominant regime of development. Rather, it was about modifications of the development discourse. For Escobar, development was universally understood "as a particular set of discursive power relations that construct a representation of the Third World whose critical analysis lays bare the processes by which Latin America and the rest of the Third World have been produced as underdeveloped" (Escobar 1992 p 47). One alternative he explored was grassroots social movements as an "analytical and political terrain in which the weakening of development and the displacement of certain categories of modernity can be defined and explored" (Escobar 1992 p 28) .

According to Arturo Escobar, the desire to alter the discourse of development was shared by a large body of scholars. These scholars shared the critical stance towards established science; an interest in local autonomy, culture, and knowledge; and a position defending localized, pluralistic grassroots movements. This stance became known as post-developmentalism (Peet and Hartwick 1999). The academic community advocating for modernization received the post-developmental criticism with skepticism; nevertheless, the introduction of dependency theory into the United States "destroyed the naïve optimism about development expressed by North American modernization theorists of the 1950s and 1960s" (Chirot and Hall 1982 p 93).

⁷ The one sided relationship between rich and poor nations was seen by Escobar (1995) as having similarities with colonialism. As a result, Escobar thought of development as neocolonialism phenomena.

Development, then, could be characterized as a power distribution arrangement, a matter of sharing the power of deciding what changes and how. The struggle is for the power to influence change, or for the creation and/or control of drivers of change, who initiates these drivers and when they take place, and the consequent courses of action that are the intent of development.

2. **World Systems Theory**

Dependency theory influenced the creation of world systems theory, which postulates the existence of a system of relationships that links societies across the world. Development of a single nation cannot be understood in isolation, nor can a country's particularities be explained without acknowledging its relationships to other nations and the history of those relationships. Some specific elements of any given society are more affected by the global structure and, in turn, determine a status and a role for that society in the global context. Some societies will be providers of natural resources, others of manufactured goods; some will be weak and dependent, and others are economically strong and politically dominant (Popenoe 1983).

The work of Immanuel Wallerstein served as the foundation for this theory. His most recognized work is *Modern World System* (Wallerstein 1974). However, it was Andre Gunder Frank who became the most intellectually influential among world systems theorists (Chirot and Hall 1982). Addressing the causes of underdevelopment, Frank (1968) argued that the formulation of adequate development theory and policy required accounting for the effects of each country's past economic and social history on its present state of development. The lack of history assumed by modernization had led to the erroneous presumption that the present state of underdeveloped nations resembled earlier stages of development of now developed countries, ignoring relationships between ex-colonies and industrial countries. Wallenstein situated the beginning of

the world system some time in the 1600s when mercantilism and capitalism expanded worldwide. For Frank (1968), the history of these relationships, within the context of expanding capitalism, defined the different types of development experienced by nations. In response, he proposed several hypotheses about how and why development does or does not occur:

- Underdevelopment was and still is generated by the same historical process that generated economic development. Frank defined an economic world-system in which existing richer nations (center of western civilization, referred to as metropolises by Frank) take the surplus of other nations in the interest of their own economic growth.
- Peripheral (underdeveloped) nations (referred to as satellites by Frank) would experience their most flourishing development when their ties to the metropolises are weakest. In times of isolation after World War I, during the depression of the 1930s, and during WWII, Argentina, Brazil, Mexico and Chile experienced their most significant industrial development. This hypothesis also helps explain why Japan, who was not a satellite of any metropolis, experienced quick industrialization at the end of the twentieth century.
- Regions with the closest ties to metropolises in the past remain the most underdeveloped and feudal-like. These regions have become the largest exporters of primary products.
- The development of latifundium⁸ results in a commercial structure that allows underdeveloped nations to respond to increasing demand in world markets by expanding the amount of land, capital and labor used in production.

⁸ A great landed estate with primitive agriculture and labor often in a state of partial servitude (Merriam-Webster Dictionary). In Latin America the latifundium (Spanish: *latifundio*) was introduced as a semi-feudal institution by Iberian settlers and was widely perpetuated in the hacienda (Encyclopedia Britannica).

- The latifundium, semi-feudal and facing an economic decline, are found in nations in former agricultural and mining export regions.

Frank did test these hypotheses, but he did not present confirmatory evidence to support his arguments. In general, the hypotheses refer to international trade and its intended or unintended consequences. At different times in history, a different set of factors shaped the way in which international trade occurred. During the modernization period, the central idea was to foster capitalism and favor urbanism. The overlap between modernization and Frank's criticism is that major cities within satellite countries used the rural communities as their own satellites. Thus, capital was extracted to serve urban growth and to serve the growth of the metropolis to which the satellite country exported its capital. Whether this interdependence of societies was overlooked by modernization theorists or not, the whole idea of inflicting change in poor nations by major infusions of capital and appropriate technologies (a major part of modernization) was described by dependency theorists and world system theorists as the center serving its own purposes by manipulating the peripheries.

World system theorists challenged another underlying assumption of modernization: that free trade (based on competitive advantages) would resolve trade inequalities among developed and developing countries. In fact, free trade was observed to benefit industrial economies and slow the development of poorer economies (Frank 1968). The more industrialized countries are advantaged in the structural dominance they can impose by setting the rules of trade. For the least industrialized and poorer countries, adaptation to external demands and influences causes a type of development that is not congruent with better conditions. Discussions of both world system and dependency theories posit that studying individual societies in isolation – or as

separate entities – is both misleading and dangerous because it hides powerful transnational driving forces of change, and it may yield incomplete and often wrong conclusions about the nature of social problems (Chirot and Hall 1982).

E. An Alternative Discourse: Emergence of Sustainable Development

Strong criticism of modernization and disillusionment with the conventional discourse⁹ of development created an impasse in development work in the mid-1980s (Simon 1997). Criticism of modernist development efforts was broad and general, despite acknowledgement that there are many variants of modernism. Responses to this criticism noted that development thinking was not reflective of a single paradigm. Rather, it encompassed a heterogeneous set of approaches that were not only variable over time but also highly diverse at any given time (Pieterse 1996, Simon 1997, Eisenstadt 2002).

Efforts to design sustainable development (SD) could be understood as a well-intentioned political action to reconcile the divergent perspectives on development. That is, whether foundations were in modernity, dependency, and/or world system theory, the broader objectives of SD created space for a common purpose. Critics of modernization saw the pairing of the terms sustainable and development as a response to observed shortcomings of development. But the view that SD represents a significant change in development thinking is not universal. Critics

⁹ In the tradition of Michael Foucault, discourse is the set of interdependent ideas that convey the underlying intentions of development. Also: a mode of organizing knowledge, ideas, or experience that is rooted in language and its concrete context (Merriam Webster Dictionary).

who perceived SD as a continuation of traditional discourse saw the new terminology as merely a rehabilitation of old concepts (Peet and Hartwick 1999).

Nevertheless, the emergence of SD marked more than a change in vocabulary because it emerged at roughly the time when environmentalism merged with development studies, long after concerns about environmental degradation caused by economic growth and exploitation were expressed. Historically, environmental concerns were framed within either the morality perspective proposed by John Muir (1838-1914) the utilitarian perspective of Gifford Pinchot (1865-1946). Both arguments served as a way to raise awareness about management of natural resources that are critical inputs to production and to support human existence (Pigou 1951, Krutilla 1967, Nash 1976). However, these environmental concerns were not taken seriously in a global sense until the period between 1966 and 1972 when environmentalism became prominent in global discussions (Dresner 2002). These changes occurred during a period characterized by support for social movements, acceptance of the critical thinking from dependency theorists and the proclamation of a new international economic order (Rist 1997).

In 1962, Rachel Carson drew public attention to the unobserved connections between human actions and ecosystem negative effects (Carson 1962); a few years later Paul Ehrlich wrote about the effects of overpopulation¹⁰ and the need to bring population growth under control so humanity would not exceed the food production capacity of the earth (Ehrlich 1968). In 1972

¹⁰ Ehrlich's predictions can be seen as neo-Malthusian because they recast and follow the same argument of population collapse due to famine proposed by T.R. Malthus (1798) over 170 years before the publication of the Population Bomb (Ehrlich 1968).

the Club of Rome published *Limits to Growth*, a report drawing attention to the interaction between population growth and increasing consumption of resources in a finite world (Meadows and Club of Rome 1972). Attention to the issues in this report may have caused a discussion about the need to address environmental concerns in order to secure the long-term survival of humanity. The environmental movement triggered a change in the way society thinks about human impacts on the natural world and reached the international stage during the United Nations 1972 Conference on the Human Environment held in Stockholm. The conference led to the formation of the United Nations Environment Programme, clearly putting environmental issues on the international agenda (Sachs 1992).

After the Stockholm conference, the relationship between environment and development was understood as important because environmental protection was seen as necessary for economic growth. Tolba (1987) listed some of the most pressing matters of the time that became the focus of the UN World Commission on Environment and Development (WCED):

- Mismanagement of the natural resource base
- Poverty and its impact on human beings and their environment
- Overconsumption and the impact of the demands of the privileged on the environment
- Population growth, especially in areas where it undermines the carrying capacity of the environment
- Squandering of natural and human resources on the manufacture of armaments
- Widespread lack of understanding on the part of decision-makers and the public at large of the implications of environmental destruction for social, economic and political stability.

The publication of “Our Common Good”¹¹ (UN World Commission on Environment and Development 1987) brought the concept of sustainability to the international debate about development (Holmberg and Sandbrook 1992, Pezzey and Toman 2002, Atkinson, Dietz et al. 2007). The work of the WCED highlighted not only economic and global environmental concerns, but also social considerations that evoked strong moral norms.

The succinct WECD definition of SD is broadly known:

“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” (UN World Commission on Environment and Development 1987)

Even though it is short, the definition warrants closer attention to its two key ideas:

- The definition focuses on 'needs', as opposed to rights or obligations;
- The definition focuses on the needs of future generations, framed in terms of limits to growth imposed by the environmental carrying capacity.

These two key ideas imbedded in the definition of SD influenced traditional development practice.

1. The concept of Needs

The overview section of the WCED report (1987 pp. 11-19) listed a diverse set of needs that should guide development practice (see figure 1). The term “need” is used throughout the document in reference to both means and ends affecting different dimensions of individuals and societies. In all cases, however, the discussion of needs reflected an understanding of wellbeing

¹¹ Also known as the Brundtland report, making reference to Gro Harlem Brundtland, Chair of the World Commission on the Environment and Development.

broader than the narrow idea of economic growth and industrialization. While both the conference and its report arose from concerns about environmental degradation, the list demonstrates recognition that individual freedoms, as well as social and political institutions, play a key role in development.

Figure 1. Development needs articulated by the WCED (1987) report

- Attend essential needs for food, clothing, shelter, jobs and beyond basic needs, aspirations to improve quality of life
- The need to have access to a level of income that allow for more than basic subsistence
- The need to have access to their local resources, particularly important for tribal and native populations
- The need for an adequate human life in urban center: clean water, sanitation, schools and transportation
- Access to food and to right to produce food in a fair international competition setting
- The need to live in peace (particularly as prevention to a nuclear war that would damage health and the environment)
- The basic right to self-determination
- The need to protect their own environment
- The need to address demographic goals
- The need to have access to energy sources and to produce energy
- The need to increase industrial production of consumable goods (produce more with less)
- The need to receive assistance and information from industrialized nations to make best use of technology
- The need to have greater control over the export of hazardous chemicals and over waste dumping
- Governments need to have urban plans
- The need to reinforce institutions working on the protection and management of natural resources
- The need to assess and report global risks

The needs expressed in the WCED report are organized according to their associations with: i) population and human resources, ii) food security, iii) species and ecosystems, iv) energy alternatives, v) industry, and vi) urban challenges. Not surprisingly, this scheme corresponds with problems produced by the modernization process and the concomitant results of rich countries affecting ***poor nations' social, political, economic and environmental sovereignty***. Moreover, the report claims that the needs of the individual and of communities are to be paid special attention; however, there is little explanation of how individuals and communities (or nations for that matter) are to become owners of their own development process. One can still

interpret from the report that they are on the receiving end of a process directed by a greater power. Given all of the criticism of hegemonic dominance, the failure of the report to mention the need to level the playing field or to have a more equitable distribution of power across nations is a glaring omission.

2. Limits of the Environment

For some critics, the concept of SD was contradictory in its terms, because it seemed the “sustainable” portion of the term was counter to the type of development that meant constant economic growth (Lele 1991). However, for SD, development meant the enhancement of society, which includes economic growth; what was not clear was how to resolve the issue of constant economic growth in a finite world, a world with limited resources¹².

Implicitly, SD rejects the assumption that environmental damages would be repaired after a country became wealthy enough to take care of the problems. SD made it clear that environmental problems were a global matter that needed attention from both rich and poor nations. The WCED warned of the conflicts arising from multiple competing needs and the urgency of transforming economic growth in a way that would account for environmental degradation and resource depletion. Specifically, recognition of conflict among identified needs

¹² Before the emergence of SD, and a few months before the publication of the Limits to Growth (Meadows 1972), a post-development, post-modern movement known as degrowth emerged from Nicolas Georgescu-Roegen’s ideas of a “declining-state” (Georgescu-Roegen 1979 cited by Muraca 2013). This movement stresses the need for a paradigm shift from constant economic growth to a process of “right-sizing” the global and national economies in acknowledgement of the carrying capacity of the Earth. The concept is well developed but is seen by some as a “political slogan with theoretical implications” (Latouche 2010 p 519).

makes explicit that ecological limitations could foreclose options for continued progress if they are not part of planning for development (Meadowcroft 1997). The recommendations from the WCED represented in practice critical trade-offs between preservation of the resource base, transformation of the type of growth, and economic growth as usual. How these trade-offs should be made (i.e., criteria for decision-making) was not addressed¹³. Nevertheless, this change in the discourse that removed economic growth as the core of development made a significant difference for development theorists and practitioners.

Including the environmental dimension in development work was a significant shift in development thinking, attitudes toward the environment, and decisions that affect it. Important reforms of development included, in particular, acknowledgement that concerns about growth and development arise from different paradigms¹⁴ and that social well being is affected not just by economic welfare but also by environmental health.

¹³ The diplomatic vagueness is intentional because “The concept was deliberately ill-defined to prevent unnecessary and destructive objections” (Middleton and O’Keefe 2001).

¹⁴ In 1912, Joseph Schumpeter made a clear distinction between growth and development. Schumpeter argued that while growth could simply mean increasing production, development occurs when production factors are used in new ways (Martinussen 1997). However, for this analysis, development entails a broader understanding that elements, other than economic changes, affect wellbeing.

F. Disciplinary Contributions to Development and Implications for Sustainable Development

1. Sociology

The contributions of sociology serve as the core for development theories; most of these contributions are discussed in the previous section on foundational theories. It is worth highlighting, however, that among the most important contributions are the theory and methods for studying social change and the observations from structural-functionalism, from which is derived the systemic understanding of society and the differentiation of roles in different sectors of society.

Although sociology provided the foundations of modernization and thus of further development theories, influence of the discipline faded as the implementation of modernization expanded and economics took a more prominent role. **Sociology became less influential in development studies for two main reasons.** First, emphasis in sociology moved from grand theories to more grounded inquiries, specifically in advancement of methods and applications. Second, the discipline experienced fragmentation into sub-disciplinary fields, each with theories of its own, which greatly diminished the global impact of the discipline on development policy (Demerath III 1996).

Subsequently, economics became the leading theoretical paradigm informing development policy. A third reason for the displacement of sociology in development is that the shortcomings of modernization as a guide for development became clear for sociologists. Sociologists' subsequent focus on dependency and world systems theories was antagonistic to the ongoing process of modernization. Modernization was better served by economics, a discipline that

developed a series of sub-fields to provide methods of inquiry and applications to implement modernization.

2. **Economics and limitations of economic modernism**

The period between the 1960s and well into the 1990s is characterized by the strong dominance of economics in informing development theory and policy, a consequence of a pivotal assumption of modernization: capitalism. Although modernization originated in sociological theories, its goal of industrialization was largely supported by economic theory and methods. As discussed previously, under modernization pure economic growth was a desirable trend for progress (Pieterse 1991); in turn, progress was measured by growth in gross domestic product (GDP), which to some extent was used to reflect wellbeing.

Middleton and O’Keefe (2001) argue that economic concerns were reduced to external costs, resource exhaustion, discounted cash-flows, common property, valuation, regulation, and cost-benefit analysis, understanding environmental problems as a market problem, rather than analysis of the market as an environmental problem. Economics, through its focus on economic modernization and development, influenced the formulation of development policy more than any other discipline. However important, though, the discipline faced strong criticism due to conflicts between theoretical assumptions and the challenges of real world problems.

The principal economic tools for policy analysis are founded on the concept of economic efficiency, but this focus has been the subject of strong criticism. For example, Bromley (1990) argued that basing social goals on economic *efficiency* was a misapplication of economics. Instead, economic efficiency should remain a normative, not positive, criterion. The difficulty in defining individual utility functions outside of theoretical models and the persistent but

erroneous contention that the aggregate of individual utilities may equal social welfare are evidence of how the economic efficiency construct falls short of providing comprehensive ways to identify socially desirable conditions. Bromley (1997) also objected to Arrow's description of how choices are made in a capitalist democracy: that “in a capitalist democracy there are essentially two methods by which social choices can be made: voting typically used to make political decisions, and the market mechanism, typically used to make economic decisions” (Arrow 1963). In turn, Bromley argued, “The market is not a mechanism for making social choices. Markets, which are socially constructed means whereby the ownership of future value changes hands, simply reflect many individual choices that, once aggregated, hold social implications. But that is very different from the idea that markets are a means for making social choices” (Bromley 1997 p 1). Furthermore, because of rent seeking behavior, self-interest, and markets prices that do not recognize other values attached to resources or their potential value in future uses, the efficiency criterion is not sufficient to guarantee protection of ecosystems (Perman et al. 2003).

As a variant of the efficiency criterion, Hicksian compensation measures address inequalities in the determination of efficiency. Hicksian compensation arises from the premise that, to the extent there are winners and losers in seeking economic efficiency, those who benefit should compensate those who lose such that all are better off (Perman, Ma et al. 2003). But in practice this compensation falls outside of the domain of economic analysis, being left, ill-defined, for policy-makers to address (Gowdy 2004).

Matters of equity are even more challenging for inter-temporal efficiency criteria applied to environmental goods, particularly because of uncertainty surrounding our current notions of what future choices and preferences will be. This makes operationalizing SD an even greater

challenge, since discounting, a principle central to economic analysis, views environmental resources as more valuable today than in the future.

Another weakness of economic modernization resides in the methods used to estimate economic values for those goods and services that fall outside of markets (Panayotou 1992; 1993). In general, resources that have some commodity value such as timber, fisheries and minerals would change hands in a market where prices capture their importance (or scarcity). More complex environmental services are not valued in market transactions, so non-market valuation methods are used (Mitchel and Carson 1989; Haab and McConnell 2002). These methods render a monetary value for environmental amenities such as clean air, quality of water, conservation of biodiversity, and scenic beauty for which no markets exist. These nonmarket values are then used to support economic decisions. For example, the use of benefit-cost analysis as a way to apply the efficiency criterion to development decisions involving the use or damage of natural resources relies upon non-market valuation methods. Serious doubts arise when questions of economic efficiency in development projects are addressed using these methods because of intrinsic biases and large margins of error (Costanza et al. 1997).

Economics has also relied on the assumption that modern societies could benefit from technological advancement. Solow (1992) argued that the contribution of economics to SD was in determining the optimal rate of reinvesting rents in order to substitute man-made capital for natural capital. However, this kind of substitution has serious limitations. Important environmental services such as life support have no known substitute in any near future (Ayres 2007).

According to views of economic modernization, the sustainability portion of SD is used as a term to signal the continuity of economic growth¹⁵. With this understanding of the term sustainability, the debate about the limits of substitution created poles of weak and strong sustainability. On one hand strong sustainability implies that substitution should be limited, and that future generations have the right to enjoy the same benefits from natural capital available for the current generation. On the other hand, weak sustainability allows substitution for natural capital with other types of capital, assuming continuous technological progress and presupposing that technological change will catch up with the rate of resource consumption and depletion in order to provide the means for substitutes to be created in time (Freeman 2003, Neumayer 2003). One economic tool arising under the weak sustainability approach is the ‘Hartwick rule’, stating that an economy depending on non-renewable resources as inputs of production could have constant consumption over time (the sustainability portion of SD) if all rents from exploitation of resources are reinvested in man-made capital. Two concerns arise from this rule; one is that utility (wellbeing) is assumed to depend on consumption only and the second is the (erroneous) assumption that natural and man-made capital are perfect substitutes for each other (Hanley, Shogren et al. 2001).

Finally, at the core of economic development resides the idea of growth measured by GDP, an indicator that in many cases is understood as a measure of social welfare and, by extension, quality of life. However, strong evidence exists that growth in GDP does not translate directly into higher levels of quality of life (Daly, Cobb et al. 1994). For example, Max-Neef (1995)

¹⁵ For this type of framing of SD, some saw the concept as an oxymoron because it suggested that it was possible to maintain constant economic growth in a world with finite resources (for instance see Lele 1991).

compared GDP and a broader measure of quality of life, the Index of Sustainable Economic Welfare (ISEW) developed by Herman Daly (1990, 1994), and demonstrated cases where GDP continued growing while ISEW began to decline. Max-Neef's work became known as the Threshold Hypothesis, showing how narrow measures of growth can be misleading for policy decisions.

The disparity between ISEW and GDP occurs because GDP does not account for natural capital erosion; for instance the cutting of timber only accounts for the generation of income produced by the sale of timber (if it is sold), while the accounting hides the fact that the resource stock is affected and other benefits from the forests (for current and future generations) are forgone. This type of accounting generates gains in income that hide permanent losses in wellbeing from the deterioration of natural capital serving as a source of materials and / or as a sink for waste emissions (Ahmad, El Serafy et al. 1989).

Based on the conceptualization of Hicksian income, stating that utility (wellbeing) does not depend on consumption only (Hartwick and Olewiler 1998), Daly (1994) argued that in order to estimate income correctly natural capital must remain intact. In practice this meant "greening" the national accounts that are used to estimate GDP by applying economic depreciation (decline in value from use) to render a residual net income that would reflect the decline in value of natural capital stocks (Hartwick and Olewiler 1998). In the case of national accounts for the U.S., this procedure would transform GDP into Net Domestic Product (NDP). NDP as a sustainability indicator is criticized for the underlying assumption of substitution and because of difficulties related to its calculation. El Serafy (1991) argued against attempting to adjust GDP to

account for depreciation of natural capital and suggested, instead, partial corrections using satellite accounts.

3. Ecological modernization and limitations

Ecology was left with the burden of proof that growth had a negative impact on the environment and wellbeing. Proponents of economic modernization (EM) assumed and argued that environmental impacts are an inevitable part of economic growth and that technological advancements will provide solutions to solve those negative impacts in an undetermined future (York and Rosa 2003). A parallel assumption is that high environmental quality is a luxury good affordable only to societies that have reached a higher level of affluence (Arrow, Bolin et al. 1995), a property of modern countries. In a similar vein, it was suggested that the relationship between economic development and environmental impacts could be characterized by an inverted U-shaped curve. Known as the Environmental Kuznets Curve, this relationship explains the relationship between affluence and environmental degradation. At early stages of economic growth (as in Rostow's stages for growth), societies are more dependent on natural resources with more extractive industries and higher production of waste, thus the upward shape of the curve indicating growing affluence and environmental degradation. As societies move from manufacturing economies to service economies, they become more affluent and less dependent on natural resources than industrial economies. This movement upward, results in fewer negative impacts to the environment due to less extractive activities and because of investments in pollution abatement (Perman, Ma et al. 2003, York, Rosa et al. 2003). The assumption is that richer countries would have less environmental impacts than poor countries.

Ecological Modernization Theory (EMT) seeks to explain the dynamics and effects of modernization on the environment. Its proponents admit that even when modern societies have caused substantial environmental problems, further modernization can solve those problems. This argument is based on the reasoning that, in modern nations, industrial firms come to recognize the importance of environmental preservation (as the resource base) for their own long term survival, and that they will take measures to reduce environmental impacts by restructuring production systems along ecological lines. The drivers of this process are – goes the argument – social institutional restructuring, technological innovation, market forces, pressure from social movements, and governmental regulation (York, Rosa et al. 2003). In general, economic modernization was more influential in decisions made about development implementation, while ecological modernization served to validate the methods of economic growth.

Another important assumption of EMT is that technological advancement will provide the means to overcome strong dependence on natural resources through substitution of alternative manufactured resources and cleaner technologies that minimize pollution (Solow 1986, Norgaard 1994). The expectations of the combined effects of technological advancement and capital substitution have been used to support arguments in favor of natural resource depletion and the acceptance of high levels of pollution in the name of progress.

After the publication of the Brundtland Report (WCED 1987), ecology became a more prominent contributor to development work¹⁶, but principally only those engaged with ecological

¹⁶ The contributions of ecology to natural resource management associated with development are older than the concept of SD. Take for instance the concept of Maximum Sustainable Yield, drawn from population ecology

modernization theory. Ecology as a general discipline tended to set itself apart from development work; there is very little integration of the discipline as a whole into development work if the development literature is an accurate indicator.

The argument that further modernization is needed to reduce environmental impacts of human activity is questioned by York and Rosa (2003) because of their concern that positive effects of modernization on environmental problems have been demonstrated in only a small number of cases. In particular, the premise of EMT that institutional structures protective of the environment are developed in late stages of modernization is questioned. York and Rosa (2003) also question the premise that as economies become more efficient in using resources, both their dependence on natural resources and the incidence of environmental damage are reduced. Again, they raise concern about the problem of small numbers, specifically of drawing such conclusions from studies of only one or two sectors of an economy. Their point is that efficiency in one sector of the economy translated into profits may be invested elsewhere and therefore contribute substantially to expanding production and concomitant resource use and pollution in the economy as a whole. A better course is to look at changes in resource use and environmental damage associated with more developed economies at a greater level of aggregation. There is still the matter of assuming that national environmental impacts are contained within national borders. York and Rosa (2003) argue that even if environmental conditions are improving

applied to fisheries. MSY is the largest average yield that can theoretically be taken from a species' stock over an indefinite period under constant environmental conditions. This concept was extended to other resources such as forests and has been an environmental and resource economics tool since the 1950s (Tietenberg 2004).

within one country that is not sufficient evidence that the country is moving towards conservation of natural resources. In fact, the economic activity could be resulting in negative impacts because of its resource exploitation in other countries.

The limitations of economics and ecology under modernization are not a matter that can be attributed exclusively to the disciplines, which are simply the means to implement the discourse of modernization. Since the late 1960s, the western-oriented approach and claims that it is universally generalizable have been viewed as inadequate in a broader sense. Becker et al. (1997) pointed out that social sciences are challenged to make theoretical and methodological advances that are up to the task of addressing problems related to the natural environment, gender relations and inequalities, and technological risks. No social science has shown itself uniquely capable of dealing with this array of problems. As such, a major difficulty is the excessive disciplinary as well as paradigmatic fragmentation both within the social sciences and between social and natural sciences (Becker et al. 1997).

G. Opportunities for Theoretical and Methodological Advancements for Sustainable Development

1. From Technocracy to Open Participation

Social transformation in developing nations in the era of modernization was not necessarily steering towards democratization. **This is because modernization was not designed to create social institutions that would strengthen democracy.** In fact economic development tended to underemphasize political and institutional considerations (Harris 2000). Modernization focused instead on increasing a nation's industrial capacity, trade, investment, and agricultural

productivity, thus creating political drivers that in some cases hindered countries' abilities to build a functional democratic structure. As a result, social choices arose not from political arenas but rather were influenced by markets and evaluated in terms of economic efficiency. For instance, in some cases poor countries experienced free trade as foreign capital dominating their economies and/or political systems, thus imposing foreign interests into local decision-making¹⁷. The lack of attention to political and social institutions basically excluded locals from the decision-making process and, as a result, negatively affected development progress.

If for Foucault the development discourse was an excuse to claim truth to gain power, the technocracy observed during modernization was an example of how western and expert values set up the rules for development. The top down approach of knowledge and authority moving from experts to non-experts in development decision-making and disciplinary reductionism lead to difficulty in allowing for collaboration across social sectors and limited sharing of knowledge among citizens and experts involved in development planning.

This technocratic model resulted in development interventions that were disengaged from public interest isolated and with short life spans. For some, this was deemed an imposition that only hindered people's ability to overcome their own social limitations. Usually large international aid organizations following the modernization model were responsible for these types of interventions. Even if planners that followed this model had good intentions, the full motivation to carry out their plan was absent as was formal accountability holding anyone responsible for getting results. Commonly, implementation of development by these organizations involved,

¹⁷ See, for instance, the role of United Fruit Company in Guatemala during the 1950s (Schlesinger and Kinzer 1982)

first, finding out what the poor needed and, second, trying to meet those needs (Easterly 2006). This potentially led to actions that were detached from community planning (if community planning existed) or resulted in multiple uncoordinated interventions.

Adopting a broader inclusive approach in development practices demanded transformations in the way development was conducted, in both paying attention to local institutions and capacities; and in making sure that local interests and knowledge were included in the process. A product of these transformations was the emergence of endogenous development and participatory rural development approaches (Peet and Hartwick 1999), which turned attention towards working with local groups to define development goals and actions. Progress under this approach results from participatory process, in which the process itself is appreciated as the construction of human capital and local capacities.

German sociologist Ulrich Beck, discussed by Fischer (2002), posited that humanity has entered into a new era of late modernity in which most social scientists have specialized in even narrower domains of social and political inquiry. The complexity of the environmental crisis challenges this technocracy, to the point of questioning what constitutes expertise, as well as who has it and who does not. SD brought the environmental crisis to development discussions, and it should be noted that one of the more significant conflicts between citizens and experts is related to environmental politics (Fischer 2002).

With the move to SD it is generally accepted that clear answers to complex social problems are just not found in science; nor is their solution purely a technical matter. The complexity arises

from work in plural settings to allow for collaboration and recognition that there are multiple approaches for planning processes. In this transition, development as an enterprise has become less focused on outcomes and more focused on processes that value the formation of different types of social institutions and capacities. Perhaps one of the most critical changes is the realization that responses to social problems are no longer exclusive to a single discipline. Rather interaction among disciplines allows for a more systemic exploration of social, economic and environmental dimensions of SD.

2. Post-Normal Science and Transdisciplinarity for Sustainable Development

Sustainable development discourse emphasizes potentially conflicting needs. Also, connections between social (economic) and natural systems are explicitly recognized and, as a result, the need for trade-offs is understood. The challenges associated with pursuing theoretical and methodological advances in the interest of SD, given the traditional approaches taken by modernist economists and ecologists, are well known. However, for SD, the challenges for aiding decisions that require difficult trade-offs stem from more than just the shortcomings of these disciplinary paradigms.

As theory and practice of SD evolve, it is increasingly evident that normal science is not an adequate source of needed innovations. Normal science was defined by Kuhn (1962) as the knowledge accepted by a scientific community, created through inquiry that builds upon past scientific achievements. In normal science, theories are not questioned, and researchers are committed to a common set of rules and standards for scientific practice. These conditions are prerequisites for the continuation of a particular research tradition.

Post-modern attitudes towards science portray unreserved criticism and skepticism about the conduct of normal science. Critics argue that the reductionist perspective of normal science prevents applied sciences from getting a grasp on complex problems. In normal science, complexity is divided into parts, and that fragmentation of the system increases uncertainty for policy decisions. In the “normal state of science, uncertainties are managed, values are unspoken, and foundational problems unheard of” (Funtowicz and Ravetz 1993 p 740). What is required is an approach that takes into consideration the non-normal state, in which unpredictability; incomplete control and a plurality of legitimate perspectives (including values) are accounted for. Post-normal science is required when normal science assumptions and approaches are inadequate for addressing the complex scenarios posed by social problems (Batie 2008) in which ethical uncertainties and conflicting purposes are found (Funtowicz and Ravetz 1993).

Wicked problems are problems that require in part a post-normal science approach, problems that are dynamically complex and ill-structured, problems of social policy (Batie 2008). In their seminal work on wicked problems of social policy, Rittel and Weber (1973) argued that traditional scientific approaches are inadequate for dealing with such problems. Problems of social policy are different from problems in natural sciences, and relying strictly upon scientific methods will not help to resolve them. As opposed to problems in science that are “definable and separable, and may have solutions that are findable”, policy problems are “ill-defined; and they rely upon elusive political judgment for resolution”. Rittel and Webber argue that there are no solutions for wicked problems. “Social problems are never solved. At best they are only resolved, over and over again” (Rittel and Webber 1973 p 160).

The problems posed by SD present the characteristics of wicked problems. This is particularly the case for several reasons. The first is because of the multiple factors contributing to locally designed notions of progress; the second is the dynamism and interaction of these factors. Third, there are multiple ways in which progress can be designed, which in turn depends not only on the availability of knowledge but also on the value system in place.

However a post-normal approach is not sufficient to address wicked problems, and although science continues to be an important informant in the development of policies (Batie 2008), the condition of broadening participation calls for other stakeholders to become part of the process of identification and solution of problems related to development in such a way that different types of knowledge and interests are accounted for. And for this, transdisciplinarity provides the methods to facilitate such a process.

Lawrence (2010) defines transdisciplinarity as an ambiguous term that has been interpreted in various ways but which focuses on the organization of knowledge around complex, heterogeneous domains, rather than the disciplines and subjects into which knowledge is commonly organized. Ramadier (2004) provides a description of how transdisciplinarity seeks to provide unity of knowledge. Considering, though, that knowledge comes from different paradigms, and that at some point these differences create contradictions, Lawrence (2010) focuses on coherence rather than unity. Lawrence (2010) describes the outcome of transdisciplinarity as knowledge representing more than the sum of its disciplinary components; the knowledge that is created is arises from acceptance that not only are there multiple

constructions of knowledge, but also that these are developed within multiple worldviews. Again, Ramadier (2004) points out that the knowledge created is not new; the innovation is in the articulation (coherence) of the existing knowledge.

The formation of a group to address wicked problems with transdisciplinarity is not a non-trivial matter. Given that problems of development are linked to policy, or at least are action-oriented, public participation in transdisciplinary development groups is a must. In this sense, transdisciplinary inquiry becomes integrative in the sense that researchers work jointly with non-traditional research partners, working with a collaborative process of knowledge production that involves multiple disciplines plus stakeholders from other sectors of society (Pohl 2008).

Perhaps one of the most relevant realizations after the definition of SD is the cognitive patterns related to the emergence of social institutions around fundamental elements of community development. Moreover, a post-normal perspective and transdisciplinarity enable the formation of these institutions.

H. Implications for Implementation

1. Results of focus on modernization

Important contributions from dependency and world systems theories did not overcome the heavy emphasis on modernization in development work. Yet, the promises of modernity, of control over nature, of peace and justice, and the acceleration of progress through planned development have deceived humanity in the sense that its result has been quite different. Rather than accomplishing such goals, modernity has fostered heavy reliance on material consumption,

accentuated inequality, accelerated the depletion of stocks of natural resources and produced degradation of the environment (Norgaard 1994). According to Norgaard, modernity, and its manifestation as development have “betrayed progress by leading us into, preventing us from seeing, and keeping us from addressing interwoven environmental, organizational, and cultural problems” (Norgaard 1994 p. 2).

From the beginning, this paper has indiscriminately used different labels for all of those nations that were not part of the industrialized-western rich countries and, thus, were the targets of development. This use was intentional, intended to reflect the diversity of terms found in the literature. Third world, developing nations, less developed countries, poor nations, the south – all of them have been used to generalize a condition other than industrialized. This diversity of terms is also a reflection of the diversity of ideas about what the objectives of development work should be. But with the definition of SD, a list of specific policy matters focused attention on the inappropriateness of promoting economic development as a general strategy, rather than attending to specific problems. The problems are not exclusive of either rich or poor nations. This observation suggests that SD does not pertain only to the (so-called) “third world” but, rather, to all nations.

2. On the matter of inequality of wealth among nations

Even with the effort to leave behind emphasis of certain aspects modernity, skeptics have questioned whether SD could make any change in the distribution of wealth across nations (Sachs 1992). The skepticism was, in part, a result of wealth distribution before and after modernization efforts were undertaken. During the 1960s, western nations were 20 times richer than the rest of the world; during the 1980s they were 46 times richer (Sachs 1992).

Given global structural relationships between poor and rich nations, in which poor nations are mostly exporters of natural resources rather than adding value to them through industrial development¹⁸, poor countries have been unable to catch up with the levels of wealth of the richer countries. In fact, even as poor nations experienced some growth, rich nations experienced even more (Frank 1980). In the “third world”, the growing rich-poor divide proved development under modernization unsuccessful. Recognizing this, former World Bank President Robert McNamara bemoaned this lack of success in a 1977 address to the Board of Governors of the World Bank.

“Development, despite all efforts of the past 25 years, has failed to close the gap in per capita incomes between developed and developing countries.... The proposition is true. But the conclusion to be drawn from it is not that development effort have failed, but rather that “closing the gap” was never a realistic objective in the first place.... It was simply not a feasible goal. Nor is it one today.... Even if developing countries manage to double their per capita growth rate, while the industrial world maintains its historical growth, it will take nearly a century to close the absolute income gap between them. Among the fastest growing developing countries, only 7 would be able to close the gap within 100 years, and only another 9 within 1,000 years” (McNamara, 1977 cited by Frank 1980 p 9).

¹⁸ At the time of the publication of the WCED report (1987), agriculture, forestry, energy production, and mining generated at least half the gross national product of many developing countries and accounted for even larger shares of livelihoods and employment. Most of these countries faced enormous economic pressures, both international and domestic, to overexploit their environmental resource base (WCED 1987).

Despite the disappointment, there were some positive outcomes of the process. Only 13 years later the first United Nations Human Development Report provided a different picture:

“The developing countries have made significant progress towards human development in the last three decades. Life expectancy in the South rose from 46 years in 1960 to 62 years in 1987. The adult literacy rate increased from 43% to 60%. The under-five mortality rate was halved. Primary health care was extended to 61% of the population, and safe drinking water to 55%. And despite the addition of 2 billion people in developing countries, the rise in food production exceeded the rise in population by about 20%. Never before have so many people seen such significant improvement in their lives.” (UNDP 1990 p 2)

The language in the United Nations report shows the effects of development from a different perspective than that of McNamara. Even though the disparity between rich and poor countries was still very large at the time of the UN publication, the UNDP focuses on improvements in the quality of life rather than income. More importantly, the results reported by the UN report are not a matter of relative welfare, comparing situations across nations; rather, the focus is on changes over time in important indicators of local welfare.

Focusing on results that are not exclusively monetary can be discussed from two perspectives. First, this focus aligns with trending notions to measure wellbeing by considering elements other than monetary wealth, which may include educational attainment, health access, security and even self-reported happiness. With this comes the acceptance that nations can have different understandings of wellbeing and, therefore, different expectations of progress. On the other hand, this argument masks a quasi-acceptance of the real poverty in those nations experiencing

less growth, the recognition of a need to solve poverty as a worldwide problem, and the admission that there is an inevitable continuation of growth in rich nations, despite the warnings about heeding the carrying capacity of the planet.

3. **From modernization to globalization**

Sachs (1992) makes a compelling argument that the events (the end of the Cold War and its consequences) of 1989 opened a door for transnational market forces to reach the remotest corners of the world. **Globalization, understood as the direct descendant of modernization, superseded the age of development.** In a fast changing world, with faster flow of information and migration, countries are no longer able to contain their cultural individualities or economic forces. Development thinking that used to focus on nations (and the divide between industrial and traditional) is less relevant given this trans-nationalization effect. Sachs (1992) argued that development became denationalized. Hindsight provides evidence that development theories became less important for providing solutions to developing nations and globalization became a stronger driving force of change, ultimately becoming an accepted development world-view. Criticisms from dependency and world system theories emphasized that Western-driven development left an imprint not only on the economies and politics of the developing world, but also in the minds of its people. Sachs (1992) observed that because countries were not able to move toward what they perceived development should be, it seemed that countries were lacking the imagination to plan their own future. Despite the retreat of hegemonic forces that, in the past, imposed a model of growth, the decolonization of the imagination did not occur because visions of development still involved patterns of large production and consumption. According to Escobar (2012), these visions reflected the intention of developing nations to replicate the type of development experienced by industrialized nations. One can also see that Sachs (1992) was

unjust in blaming nations for the lack of imagination; clearly, despite rejection of grand theories, the inertia of modernization was still a strong driver of development. Modernization was a worldwide effort that was implemented using vast financial and human resources that shaped minds, institutions and models of governments in many countries. Thus, expecting the change to occur rapidly was unfair.

The new geopolitical order, however, has created openings for more actors (besides just rich nations) to become drivers of change, bringing different views of what constitutes positive change. This has meant a break away from a dominant hegemonic discourse to be adopted and the exporting of social institutions (from rich to poor nations). SD has provided policy directions that highlighted pressing matters in countries around the world. In addition, agreements on international cooperation have helped to bring together divergent meanings of development to convey on the solution of pressing matters. Rather than a grand theory supporting the practice of development, implementation was supported by a diverse array of non-consolidated methods with each method fueled by its own purpose.

4. New challenges and propositions (trends) after sustainable development

The description of development in the context of an east-west division evolved to a rich-poor division (Sachs 1992). In the process, a more complex development theory became necessary to frame the multiple realities associated with the rich-poor division. In capturing these multiple dimensions, the United Nations Millennium Development Goals have become particularly important in official development discourse (Chambers 2005 p 199). Under this discourse, local development approaches become more accepted, not only for developing nations but also for

developed nations that find within their own territories social ills and claims for attention to needs of justice, equity in the distribution of wealth, and needs related to poverty.

The implementation of development seems fragmented and lacks unity. However, concepts and methods from the United Nations remain influential. The UN Report on Human Development (1990) switched the focus of development from human needs to freedom of choice. This change draws from the works of Amartya Sen (1999) who argued that the “expansion of freedom is viewed, in (his approach), both as the primary end and as the principal means of development” (Sen 1999 p xii). Under this approach, choice refers to a range of articulated alternatives available to individuals and collectives, operationalized through networks of roles and institutions (Apter 1987). The change of focus is key; implicitly it acknowledges the sovereignty of nations or societies and that change shall no longer be a consequence of external influence; rather development should be a local process.

With acceptance that development actions are highly dependent on the context of the region or country in which they take place, and with replacement of grand theories, development now is guided by a set of principles, important transformative elements that emerged during the post-modern period. One could argue that the concept of SD emerged along with these elements. The elements continue to evolve in their own spaces, and their combination gives a picture of what development is becoming.

- Paradigmatic advances, such as pluralism, encourage opening participation in decision making to multiple stakeholders to take ownership of development planning. Planning for the future is no longer understood only as a matter of experts.

- Embracing complexity, a paradigmatic change is occurring within both disciplinary fields and the policy-making domain. These changes involve taking a broader view of the definition of systems under observation and paying attention to the interrelatedness of elements that portend wicked problems. At the time of when SD was defined, this was proposed as broadening worldviews to take a holistic perspective.
- Science is recognized as having limitations for addressing pressing issues; special attention is given to the combination of experts and political and public knowledge. The political dimension gains attention.
- Disciplinary fields begin to break away from the rigidity of their own theoretical assumptions creating knowledge across disciplines and seeking coherence in their approaches to common social problems. It is acknowledged that the complexity of the development problems cannot be solved using single cognitive paradigms.
- The value system upholding development theories is also transformed, showing acceptance (at least in theory) of the moral obligation to nature and future generations and commitment to fairness and justice as part of development.
- Interdisciplinary methodological advances focus on sustainability, which begins to emerge as a field in itself.

I. Conclusions

Single grand theories of development went through an experimental phase in history; however, the appropriateness of a single model of development was a technocratic illusion. It is evident now that each society or country cherishes its own differences that would impress particularities on the progression of development that each would like to experience.

The cognitive processes that resulted in the emergence of SD also fostered the advancement of disciplines and methods for development. In this transition, important transformations were experienced:

- Modernity masked the diversity of “traditional” communities (nations) and considered them a singular figure. This assumption of homogenous backwardness was rejected in favor of recognition of diversity across nations and cultures. Modernity also masked the inequalities and the power relations among nations. dependencists and world-system theorists made clear that interrelations among nations are important factors to determine the type of development that each nation can experience.
- The creation of greater environmental awareness supported the advancement of development theory and methods by making explicit the role of the environment in economic planning and policymaking.
- Post-modern criticism to modernity allowed for expansion of the understanding that development is not only a function of industrialization but also of differences in power, class, gender, and ethnicity. These factors remained obscured during modernization.
- The premise that economic growth is necessary for development remains even after the decline of modernization as a doctrine for development. This occurs despite acknowledgement that a different type of growth is necessary, one that would satisfy concerns about environmental degradation caused by current trends in consumption and constant economic growth.
- Elements of modernity that were clearly rejected include:
 - the assumption that there is a known path for development, specifically replication of the western model of progress in developing nations.

- the argument that the catalyzer of development is external to the country or society in need. Rather, locals should take ownership and define their own vision and plans for development while seeking cooperation with external partners.
- that social institutions generated through an experience in one country can be replicated in another. Rather, fostering the formation of local institutions and capacities is emphasized.

Methodological advances that are setting trends in development theory and practice include:

- Rejection of expert knowledge as deterministic. SD requires constant questioning of the epistemology of disciplines and acknowledgement that there are limits to current knowledge.
- Involvement of open participation in the process of planning for development in response to the recognition that social decisions cannot be made in technocratic isolation.
- The importance of transdisciplinary inquiry to address wicked problems.

All theories and methods that can be viewed as part of the field of development are moving this field in the direction of becoming a non-traditional discipline in the sense that development draws from broader fields that involve different disciplines and sectors of society that are highly adaptable to different territorial scales and to different contexts.

CHAPTER 2 - A proposition for Building Common Understanding across Different Constructions of Sustainability

A. Introduction

The preceding chapter of this dissertation provided a discussion of theory and methods for international development and the impact on development planning. That discussion serves at the starting point for this paper, which focuses on more recent history and the evolution of sustainability, which has become an area of study on its own.

Sustainability encompasses the more recent knowledge intended to address global concerns, or, as Orr (2002) states: a “keystone of the global dialogue about the human future”. However, multiple interpretations of sustainability complicate efforts to implement it. These multiple interpretations are the product of different disciplinary fields in which academics have constructed sustainability with the intent to offer solutions to pressing issues. In general, these constructions appear similar because they connect around similar pressing matters. As a result, decision-makers interested in implementation often interpret information about sustainability as an aggregated set of actions derived from diverse disciplinary fields as though they fully complement each other. However, there are fundamental differences. Close observation of these actions reveals significant inconsistencies, particularly in terms of motivations behind recommended practices.

The sustainability literature fails to offer a way to analyze and explain the values associated with the concept of sustainability. The fast move from concept to practice of sustainability has largely neglected attention to values. Broader interpretation of sustainability based on an expanded understanding of underlying ethics may be useful because it appears that the source of conflict

across different interpretations and practices originates at the level of values held within each field of knowledge. Rather than looking at ways to reconcile competing actions targeting sustainability, it may be logical to look at the values invoked by sustainability practices and use them as criteria to facilitate deliberation.

This paper seeks to contribute to the advancement of sustainability by addressing four key objectives.

- Explore different ways of understanding sustainability,
- Offer a critique of making sustainability decisions based upon only one way of understanding sustainability,
- Propose that a value-based criteria is required for common understanding of sustainability, and
- Recommend a set of minimum standards that could reconcile actions reflecting diverse perspectives on sustainability.

To accomplish these objectives, the origins and evolution of sustainability from the fields of sustainable agriculture, corporate social responsibility (sustainability in the business sector), and SD are examined. This process describes how each field has constructed sustainability and created claims of what their conceptualization entails. A discussion of why values can bridge understanding across interpretations of sustainability is presented, and a case is made for a set of minimum standards appropriate for actions in the interest of sustainability.

B. Sustainable Agriculture

Sustainable agriculture, a relatively recent concept, was proposed in the late 1970s as a set of strategies to guarantee the continuity of agriculture. The recommendations of these strategies were, for the most part, triggered by concerns about the negative and unintended impacts of industrial agriculture that threatened environmental quality, human health and the agricultural economy (Douglass 1984, Bird and Ikerd 1993, U.S. National Research Council and Committee on Sustainable Agriculture and the Environment in the Humid Tropics 1993, Gold and U.S. National Agricultural Library 1999, Pretty 2008). There is no doubt that the industrialization of agriculture was an important step towards alleviation of poverty and hunger around the world. It made possible productivity gains that lifted millions out of poverty and provided a platform for rural and urban economic growth in many parts of the world (Pretty 2008)¹⁹. International development efforts relied on intensification of agriculture as the base for initiating other industries; it was viewed as an effective first step because industrial agriculture lowered the price of food and increased the income of the poor while freeing resources for improvements of households' living standards (Grove and Edwards 1993).

Industrialized farming systems varied broadly from country to country, according to cultural context and soil and climatic conditions. However, the industrialized systems were commonly characterized by rapid technological innovation, large capital investments, large-scale farms,

¹⁹ Since the beginnings of the 1960s aggregate world food production has grown by 145% ([FAO 2005 FAOSTAT database. Rome, Italy: FAO] cited by Petty 2008). Gold and U.S. National Agricultural Library (1999), citing data from the World Bank, note that 70% to 90% of increases in food production over this period are the result of industrial agriculture rather than greater acreage under cultivation.

continuous monoculture or bi-culture cropping systems; use of high-yield hybrid crops; extensive use of pesticides and fertilizers; high dependency on external inputs; high labor efficiency and confined livestock systems (Gold and U.S. National Agricultural Library 1999). For Strange (1988) and Bird and Ikerd (1993), the attributes of industrialized agriculture included: i) centralized management; ii) emphasis on specialization (competitive advantages); iii) the number of hired-worker days exceeding the number of on-farm work-days by owners; iv) separation of management and labor; v) use of technology to minimize labor inputs; vi) heavy reliance on purchased inputs; vii) technology designed to minimize real-time, in-field decision making; and, viii) emphasis on standardized farming practices.

As industrial agriculture advanced on a global scale, the impacts on the landscape and the environment became widely recognized as sources of unintended negative impacts threatening the wellbeing of both human and ecological systems (Carson 1962). Concerns were also raised about threats to the productivity of agriculture for needed food, fodder, and raw materials (Douglas 1984).

According to Bird and Ikerd (1993), industrial agriculture in the US caused:

- A decrease in the number of farms, which in turn meant an increase in farm size;
- Major purchases of off-farm inputs (great dependency on chemicals);
- An increase in risks associated with environmental quality and human health;
- Relatively little reliance on local rural communities;
- Limited direct contact between rural people and people in urban and sub-urban environments; and,

- Important long-term detrimental impacts to the natural resource base upon which agriculture depends.

Schaller (1993) listed problems associated with conventional farming and portrayed them as hidden costs of modern industrialized farming, costs that were justified by the gains in food production during the last century

- Contamination of ground and surface water by agricultural chemicals and sediment;
- Hazards to human and animal health from pesticides and feed additives;
- Adverse effects of agricultural chemicals on food safety and quality;
- Loss of the genetic diversity in plants and animals;
- Destruction of wildlife, bees, and beneficial insects by pesticides;
- Growing resistance of pests to pesticides (exacerbating the effects noted above);
- Reduced soil productivity due to soil erosion, compaction, and loss of soil organic matter;
- Over-reliance on non-renewable resources; and
- Health and safety risks incurred by farm workers who apply potentially harmful chemicals.

Hansen (1996) added other problems to this list: increasing inequity, declining rural communities, loss of traditional agrarian values, decreasing food quality, reduction of farm worker safety, and decline in self-sufficiency. In developing countries, most problems aforementioned were exacerbated by the pressures arising from poverty and the demand for low cost food, the rapid expansion of population, extensive deforestation, inappropriate use of fragile soils, soil erosion, loss of soil fertility, water management problems, and the consequent rapid

reduction in production potential (U.S. National Research Council and Committee on Sustainable Agriculture and the Environment in the Humid Tropics 1993).

Sustainable agriculture became a point of convergence in response to this large range of concerns about the human and environmental impacts of industrialized agriculture. The response took the form of multiple models of agriculture proposed as alternatives to modern industrialized or “conventional” agriculture. All of these models were intended to assure sustainability of agriculture. Consequently the term sustainable agriculture became a label for an array of farming approaches, including: organic, bio-dynamic, agro-ecological, permaculture, reduced-input, low-input, regenerative and alternative agriculture (Neher 1995, Hansen 1996).

1. The shift in thinking about agriculture

Ikerd (1993) argued that differences between conventional and sustainable agriculture are much more a matter of differences in farming philosophy than in farming practices or methods. Gold (1999), drawing from Stauber et al. (1995), described the philosophy of industrialized agriculture, arguing that this type of agricultural system interpreted nature as a competitor to be overcome; understood that progress required unending evolution of larger farms and depopulation of farming communities; measured progress primarily by increased material consumption; measured efficiency in terms of productivity²⁰ and income; and had strong reliance upon science as an unbiased enterprise producing wellbeing. In short, the conventional

²⁰ The goal of industrial agriculture is to serve industrial development to “increase human wellbeing by increasing production of material goods and services, and simultaneously increasing aggregate employment and incomes” (Ikerd 1993 p 147).

agriculture philosophy understood farms as factories and plants and fields and animals as productive units (Ikerd 1993).

In contrast, earlier contributors to discussions of alternative agricultural models, such as Robert Rodale, proposed an evolution of agriculture in three phases: i) discover the natural resources upon which agriculture is based; ii) use these resources for high production initiatives; and, iii) development a partnership with nature for sustainable food, feed, and fiber production in an environmentally sound and socially acceptable manner (Rodale, 1981, cited by Bird and Ikerd, 1993).

Pretty (2008 p 451) lists four key principles for sustainable agriculture:

- Integrating biological and ecological processes such as nutrient cycling, nitrogen fixation, soil regeneration, allelopathy, competition, predation and parasitism into food production processes,
- Minimizing the use of those non-renewable inputs that cause harm to the environment or to the health of farmers and consumers,
- Making productive use of the knowledge and skills of farmers, thus improving their self-reliance and substituting human capital for costly external inputs, and
- Making productive use of people's collective capacities to work together to solve common agricultural and natural resource problems, such as for pest, watershed, irrigation, forest, and credit management.

Ikerd (1993) argued that a new paradigm of sustainable agriculture must:

- Use farming systems that conserve resources, including soil and water.
- Protect the environment, (e.g., water quality);
- Produce efficiently (e.g., maintain profitability of farms),
- Compete commercially, and
- Enhance the quality of life for farmers and society overall

The pragmatic nature of the propositions for sustainable agriculture led some to think of sustainable agriculture as a goal. For instance, the U.S. National Research Council (1991) defined it as a system of food and fiber production that holds productivity goals. This was perhaps due to the implementation-oriented nature of agriculture. However, at a broader conceptual level, it represented a change in philosophies and in the value system underlying human actions and resulted in fundamental changes to agricultural practices. The values invoked by sustainable agriculture reflected a higher degree of awareness of the function of agriculture within society and its interactions with nature. They also reflected a higher degree of civic empowerment in the short term and a statement of a long-term moral obligation to future generations. Framing sustainable agriculture in terms of the short and long run interrelations among people, ecosystems, land, plants and animals reflected a understanding of agriculture as a sub-system of a larger system. This holistic, systems perspective satisfies Thompson's (2007) condition that no human practice can be deemed sustainable or unsustainable in isolation. Similarly, Norgaard (1994) described the errors of focusing on agricultural production in isolation without regard for its connection to farmers, the social system and the surrounding agro-ecosystem.

Table 1. Contrasting approaches of conventional and sustainable agriculture as characterized by Hill and MacRae (1988) (Source: Hansen 1996)

<i>Conventional</i>	<i>Sustainable</i>
Symptoms	Causes, prevention
Reductionist	Holistic
Eliminate 'enemies'	Respond to indicators
Narrow focus (neglects side-effects; health and environmental costs ignored)	Broad focus (sub-cellular to all life, all costs internalized)
Instant	Long time frame (future generations)
Single, simple (magic bullet, single discipline)	Multifaceted, complex (multi- and trans-disciplinary)
Temporary solutions	Permanent solutions
Unexpected damages (to person and planet)	Unexpected benefits
High power (risk of overkill and errors/accidents)	Low power (minimal risk)
Direct 'attack'	Indirect, benign approaches (catalytic, multiplier, synergistic effects)
Imported	Local solutions and materials
Focused on products	Focused on processes, services
Mechanical-chemical (often unnatural, synthetic)	Bio-ecological (natural)
Technology-intensive	Knowledge/skill intensive
Centralized	Decentralized (human scale)
Values are secondary	Compatible with higher values
Expert, paternalistic (arrogant)	Individual/community responsibility (humble)
Dependent	Self-maintaining/regulating
Inflexible	Flexible
Ignores freedom of choice (unjust)	Respects freedom of choice (just)
Disempowering	Empowering
Competitive	Co-operative
Authored	Anonymous (seeking neither reward nor fame)

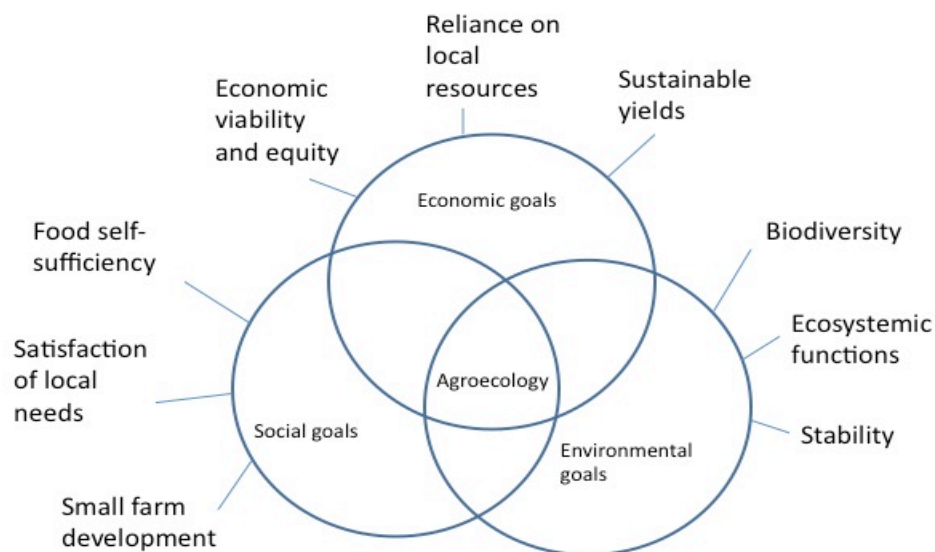
2. Dimensions of sustainable agriculture

A framing of sustainable agriculture as more a philosophy than a set of farming practices or methods is evident in the way Douglas (1984) described three general ways that sustainable agriculture is pursued. Douglas summarized perspectives represented by those writing for his edited volume as falling generally into three schools of thought that differ principally by what is deemed important. They are:

- *Sustainability as food sufficiency* is embraced by those concerned with the permanent availability of resources (soil, water, crops and technological advances) to produce food and meet increasing demands. The central concern of this school of thought is to know what the future demands for food will be. The production of food is pursued with technological determinism that fails to acknowledge the environmental costs of the expansion of agriculture.
- *Sustainability as stewardship* is embraced by those who think of agricultural sustainability in terms of ecological concepts rather than only economic. In this line of thought environmental resources are also seen as both the basis and the limits of production. The sustainability of agriculture depends upon the availability of renewable resources and the capacity to control the demands for agricultural outputs, meaning controlling per capita consumption or the size of the population.
- *Sustainability as community* is embraced by those concerned with the values of community. This group focuses on alternative agricultural methods that also draw insights from ecologists but emphasizes changes to agricultural communities due to modern farming techniques. This group pays particular attention to the quality of the relationships among human and non-human members of the communities and observes the willingness of participants to mutually cooperate for the wellbeing of the community. Under this view the prosperity of agriculture is tied to the prosperity of rural communities.

The three perspectives on sustainable agriculture described by Douglas compare to some extent to previous work of Altieri (1987), in which he originally described agroecology as an alternative model of agriculture. Altieri used a Venn diagram (see figure 2) with which he proposed agroecology as the way to meet a series of goals consistent with securing the sustainability of agriculture. He presented the goals in terms of social, economic and environmental dimensions of agriculture. Given the breadth and long-term impact in which Altieri presents these goals one can also understand them as a transitional process that is suggested as a progression from a culture of traditional agriculture to agroecology. Agroecology for Altieri means stabilization, a harmonious state of balance among economic growth, social equity and environmental preservation (Altieri 1987).

Figure 2. The role of agroecology in the satisfaction of social, environmental and economic goals. Source: (Altieri M.A. 1987)



Altieri contrasts the breadth of scope of agroecology with that of conventional agriculture. From an agroecological perspective, the productivity of an agricultural system is understood as integrating those socio-economic factors that influence decisions about production with the political agenda of development, the technological limiting factors, and the environmental conditions (Altieri 1989). In contrast, for conventional agriculture, agricultural productivity is understood as a technological problem only, without consideration of farmers and their way of living (agriculture as culture), understanding the system as mechanistic and atomizing its parts for their separate study (Norgaard and Sikor 1987).

Both Altieri and Douglas view sustainable agriculture in broader terms than just a technical matter concerning only agricultural systems. The expansion to broader dimensions makes a strong statement that agricultural sustainability should both reorient methods and practices and address socio-economic complexities and ecological constraints. The major distinction between Douglas and Altieri, however, is that Douglas proposed that the three dominant visions of sustainability be integrated into a single conception. The definitional compromise that Douglas proposed is based on close observation and desirability of agricultural cost reductions. Specifically he discussed the extent of the social, environmental and economic costs of agriculture that, in his view, should be reduced to secure the sustainability of agriculture. He also suggested the incorporation of notions of justice or equity into the integrated definition of sustainable agriculture. With this, he defined agricultural sustainability as ways “to meet future demands for foodstuffs without imposing on society real increases in the social costs of production and without causing the distribution of opportunities or incomes to worsen” (Douglas 1984 p25).

From a broader perspective, Thompson (1992) described two different conceptualizations of sustainability to be found within sustainable agriculture debates. First, as a system-describing concept, sustainability is interpreted as either an ability to fulfill a diverse set of goals or as an ability to continue. This concept would capture the use of sustainability as criterion for guiding agriculture as it responds to rapid changes in its environmental, social and economic dimensions. According to this perspective, when there are multiple goals, the competing priorities should be pondered according to some criteria to help decisions about with tradeoffs. The second conceptualization is goal-prescribing, in which sustainability is interpreted in terms of ideology or management. Those understanding sustainable agriculture as a goal seek to resolve problems by proposing alternative methods of agriculture. With this interpretation, with an ideological or management goal, sustainability becomes the single higher order priority that overrides other competing priorities.

In a further elaboration of the two conceptualizations, Thompson (2007) considered how people define and use the concept of sustainability in problem solving and policy contexts. He suggested that people view sustainability from two main perspectives: functional integrity and resource sufficiency. Concerns about functional integrity are about resilience of human and ecological systems and the capacity and continuity of the systems. Not only is ecosystem integrity critical but also integrity of social institutions (formal and informal) upon which a functional society rests. That the system has functional integrity means that the system establishes a range for the reproduction of crucial elements allowing them neither to increase without limit nor to disappear from the system altogether (Thompson 1995).

The resource sufficiency view involves the measurement and availability of resources with respect to the amount of time a human practice or process can be continued. Thompson (2007) notes that the availability of resources over some period of time must be established, as well as the notion that growth will be hampered by resource scarcity. The resource sufficiency approach prescribes that a decreased rate of consumption or the substitution of man-made resources for natural resources is necessary to enable continued consumption.

Categorizations of sustainable agriculture are for the most part made under the assumption that science is responsible for the organization of knowledge around sustainability. However, the concerns, responses and alternative methods of agriculture are highly diverse and rely heavily on the normative idea of social transformation. As Thompson (2007) notes, this will not come from technical recommendations alone; rather it falls to public policy and local decision makers to better define the desired course of action.

C. Sustainability in the Business Sector

The evolution of the meaning of sustainability in the business sector has certain similarities with that of agricultural sustainability. In each case, values have been re-stated due to observed problems with undesirable results; subsequently new theories and practices have formed around new goals. The systemic perspective for a multidimensional understanding of sustainability has also evolved. However, the conceptualization of sustainability within the field of business, particularly its economic and social dimensions, varies greatly in terms of scale and scope. This contrast begins within the origins of the doctrine of corporate social responsibility.

The 1950s marked the modern era of what was referred as the social responsibility of business, rather than corporate social responsibility (CSR); during this period discussions of modern corporations were less common (Carroll 1999). Nevertheless, Carroll (1999), citing the work of Howard Bowen (1953), described the largest businesses in the U.S. as powerful centers of decision-making whose decisions affected the lives of many and impacted society at large. Thus, the initial definition of social responsibility in a business context referred to “the obligations of businessmen to pursue those policies, to make those decisions, or to follow those lines of action which are desirable in terms of objectives and values of our society” (Bowen 1953 as quoted by Carroll 1999 p 270).

During the early 1970s, Dow Votaw (1972) argued that the phenomenon of “social responsibility” was the response to transitory social pressures. At that time, Votaw argued that social responsibility should be understood as a deeper transformation of society, with profound implications for the organization and structure of the business sector. He listed three reasons for this:

- Social responsibility is a condition rather than a policy or temporary corporate response. The condition meant for the private sector a change in standards in response to unjust racial conditions and concerns over degradation of the environment.
- The social problems addressed by social responsibility were neither isolated nor transitory and were “connected in substantive ways”, many of them arising from deep social currents.
- Many businessmen overlooked the long-range character of the pressures to which the business sector was responding.

Votaw (1972) also argued that the obligation of the business sector to act was not only due to social pressures, but also to higher obligations within society. The traditional obligation of the business sector was production, and as such “production was the overriding social, as well as economic, goal” (Votaw 1972 p 31). However, as Votaw (1972) noted, social values and goals lose their meaning and become inconsistent with current events. Thus, in the post-industrial society, production was no longer the primary goal because it had already been achieved. “In a land of scarcity economics is King; in a land of plenty, economics is just another member of the court” (Votaw 1972 p 30). Votaw (1972) observed that society at large was experiencing a cultural transformation in terms of how the role of capitalism was viewed. The new social responsibility of business then, was to adjust its role within society, with clear understanding that the business system operates as a sub-system of a larger system. Thus, Votaw (1972) argued, the responsibility of the business sector extends far beyond the firm and the stockholders.

Over the decade of the 1970s, the language of corporate social responsibility began to replace social responsibility (Carroll 1999). Votaw (1973) revisited his ideas, this time referring to corporate social responsibility, and provided more reasons for the importance and convenience of this doctrine for the business sector. In both 1972 and 1973, Votaw described what he called “social pressures” only very generally. However, in 1973 he was more specific about environmental degradation concerns and social concerns such as racial injustices that should be addressed by businessmen in order to prevent unpopularity and failure. He reiterated the importance of recognition by businessmen of the impacts of corporate conduct on society; he also encouraged corporate responsibility for environmental impacts, noting that the “DDTs” of

the future cannot be handled as in the past (i.e., responding only after discovering catastrophic environmental events). His idea of CSR was basically to see “social needs as business opportunities and business as a revolutionary force” (Votaw 1973 p 7).

While Votaw’s ideas were expansive and visionary, his language was understandably reserved. During the period of his writing, concerns about social pressures could easily be interpreted as attacks on capitalism and, thus, viewed as communism (see, for instance, Milton Friedman 1970). Similarly environmental awareness arguments could easily have been understood as a costly imposition on the business sector and thus dismissed. In fact, when Votaw (1972) addressed the economic implications of CSR, he distinguished between those who do business as usual and those “doomsayers” who think that the greed of capitalism prevents society from achieving a state of economic and environmental bliss. It appears his intention was to prove that he was on the side of businessmen and arguing as an inside voice. Perhaps one of his more important contributions was to restate the social accountability of the business sector.

“After the business leader becomes amenable to the new perception of social responsibility, he must still examine the implications of doing so. The goal of social responsibility is not responsibility but responsible social action, and society is the ultimate judge of whether social action has been responsible. The businessmen cannot take lightly even the expedient view of social responsibility, because there are implications for him, and for everyone, in how he conducts himself” (Votaw 1973 p 17)

CSR became a way to persuade individuals in the business sector to incorporate social concerns into the process of conducting business. The principle argument for CSR is that, in a world concerned about social and environmental issues, firms may help themselves to succeed by transparently operating in a socially and environmentally responsible manner. Rather than a detailed chronology CSR, the focus here is on the conclusive aspects of the evolution that led to definition of the elements to be considered for sustainability in business. Carroll (1999) identified the early version of the four components of CSR: economic, legal, ethical and discretionary. In this account, economic referred not to the economic prosperity of a region but rather to something that firms do for themselves, in other words, financial profitability. The legal, ethical and discretionary components were more understood as concerns for the interests of society.

1. Change in foundational ideologies

Before the 1960s, social activism pushed for changes in the business mentality that the sole responsibility of corporations was to provide maximum financial return to stakeholders. Social activism along with subsequent 1970s federal legislation²¹ made business accountable for social and environmental responsibilities; the new national policies of that time officially recognized the environment, employees, and consumers to be legitimate stakeholders of business (Carroll 1991). Thus, generation of profits plus cost effective solutions to social and environmental concerns became the trifecta for CSR.

²¹ Creation of the Environmental Protection Agency (EPA), the Equal Employment Opportunity Commission (EEOC), the Occupational Safety and Health Administration (OSHA), and the Consumer Product Safety Commission (CPSC).

During the period of modernization's dominance in the discourse of development, achieving economic growth and advancements in areas such as markets, trade, investment, agricultural productivity and industrialization were sufficient to define progress (Harris 2000). From that perspective, business profitability occupied the top priority over any other environmental or social concerns. An important driver of change in this business mentality came with the change in development discourse rejecting the notion that economic growth equals human progress (Magis and Shinn 2009). The move from the one-dimensional measure of gross domestic product as an indicator of economic growth to multi-dimensional measures intended to capture wellbeing in a broader sense marked this change. To some degree, this paradigmatic change diminished the political leverage of the business sector. This also enabled a context for environmental and social policies to be enacted.

2. The components of corporate social responsibility

Based on multiple contributions to the definition of CSR, Carroll (1991, 1999) constructed the pyramid of social responsibility (see figure 3). His purpose was to encompass the entire range of responsibilities that should be accepted as part of CSR by any responsible business. Although he acknowledges that, to some extent, the legal and economic components have always existed, it is the ethical and philanthropic functions that have taken particular predominance in recent years.

Economic Component

Businesses want to produce goods and services that consumers need and want while making an acceptable profit. This component entails the following responsibilities:

- To perform in a manner consistent with maximizing earnings per share.

- To be committed to being as profitable as possible.
- To maintain a strong competitive position.
- To maintain a high level of operating efficiency.
- It is important that a successful firm be defined as one that is consistently profitable.

Legal Component

Firms are expected to operate and pursue their profit missions within the framework of the law. The responsibilities of this component coexist with the economic ones as foundations of free enterprise. Legal responsibilities include:

- To perform in a manner consistent with expectations of government and law.
- To comply with various federal, state, and local regulations.
- To be a law-abiding corporate citizen.
- It is important that a successful firm be defined as one that fulfills its legal obligations.
- It is important to provide goods and services that at least meet minimal legal requirements.

Ethical Component

This is the most normative stance in CSR because it embraces all business standards and norms, either expected or prohibited, by business stakeholders. In this case, it is assumed to be a responsibility for all concerns raised by consumers, employees, shareholders and the community at large. Responsibilities of ethics include

- To perform in a manner consistent with expectations of societal mores and ethical norms.

- To recognize and respect new or evolving ethical/moral norms adopted by society.
- To prevent ethical norms from being compromised in order to achieve corporate goals.
- It is important that good corporate citizenship be defined as doing what is expected morally or ethically.
- To recognize that corporate integrity and ethical behavior go beyond mere compliance with laws and regulations.

Philanthropic Component

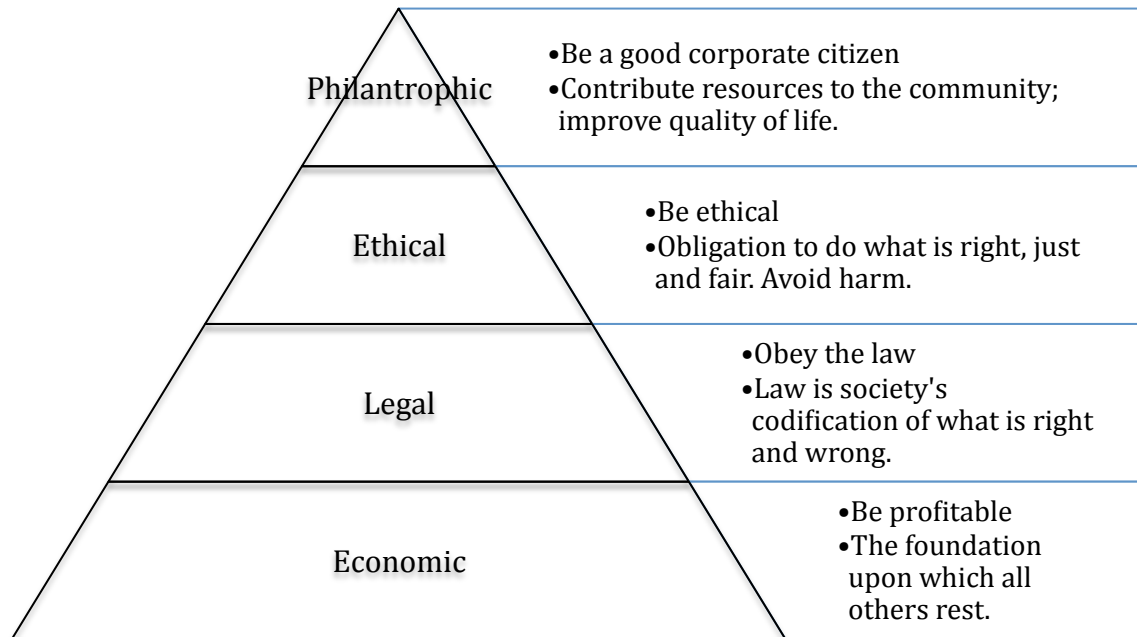
Similar to the ethical component, this component encompasses business actions expected by the community for a business to be considered a “good” corporate citizen. Carroll (1991) distinguishes ethical from philanthropic actions by stating that the latter are not expected in a moral sense. The philanthropic component refers to business actions that transcend responsibilities and are, instead, voluntary actions of businesses to contribute to the wellbeing of a community. These actions included:

- To perform in a manner consistent with the philanthropic and charitable expectations of society.
- To assist the fine and performing arts.
- It is important that managers and employees participate in voluntary and charitable activities within their local communities.
- To provide assistance to private and public educational institutions.
- To assist voluntarily those projects enhancing a community's "quality of life."

Carroll's pyramid of CSR depicts the four components as layered and suggests that the fulfillment of all components is necessary for comprehensive engagement in CSR. A firm would reach higher degrees of CSR as it undertook greater efforts on the higher levels of the pyramid. However, because of the hierarchical positioning of the components, the pyramid can also be misunderstood. It was not Carroll's intention to suggest that a lower component is necessary before moving onto the next higher (one as in the Maslow pyramid of human needs). In fact, he asserts that economic and legal responsibilities are unavoidable, while the more ethical and more philanthropic a firm is, the higher degree of CSR it exhibits.

From a classical microeconomic perspective, profit maximization is a firm's goal. The CSR framework breaks with classical economics by expressing that profit (economic responsibilities) should not occur without attending to legal and ethical responsibilities. Yet, making businesses socially accountable for ethical or unethical actions is consistent with classical economic arguments for market-based responses (with less governmental intervention) to problems. This argument implicitly acknowledges a level of power that consumers and citizens can have as stakeholders of a firm. However, it also assumes the existence of an arena where this power can be exercised and a level of organization with very low transaction costs.

Figure 3. Pyramid of corporate social responsibility (Source: Carroll 1991)



Strong opposition to these ideas can be found in the business literature (see, for instance, Buchholz 1991, Klonoski 1991). Milton Friedman is frequently cited for his arguments, in the article “The social responsibility of business is to increase its profits” (Friedman 1970) that profit maximization is an acceptable (and sufficient) social behavior and that the current legal framework already dictated the responsibilities of a firm. Friedman, like other critics, questioned the practical exercise of CSR.

“What does it mean to say that the corporate executive has a "social responsibility" in his capacity as businessman? If this statement is not pure rhetoric, it must mean that he is to act in some way that is not in the interest of his employers. For example, that he is to refrain from increasing the price of the product in order to contribute to the social objective of preventing inflation, even though a price increase would be in the best

interests of the corporation. Or that he is to make expenditures on reducing pollution beyond the amount that is in the best interests of the corporation or that is required by law in order to contribute to the social objective of improving the environment. Or that, at the expense of corporate profits, he is to hire "hardcore" unemployed instead of better qualified available workmen to contribute to the social objective of reducing poverty."
(Friedman 1970)

What could not have been anticipated in making this argument is the role of the informed consumer and growing awareness of corporate malpractice in the age of information. As it is observed today, consumers have the power to choose from among firms based on the perceived level of engagement in matters related to CSR. Firms may view this consumer behavior as an incentive to do more than merely what is required by law and for the sake of competitiveness. This latter argument is how CSR is to influence firms to view business sustainability in a comprehensive manner, one that considers profits, the environment and people as a way of business. Another point missed by Friedman was that, as Votaw (1972) noted, the social and environmental pressures raising concerns were also creating profound cultural changes that would affect business structure and organization in multiple ways for the long term. Contrary to the static position of Friedman (1970), Votaw (1972) tried to encourage the business sector to be more responsive and learn by being observant of cycles of changes in the values system that preceded the creation of new laws; he stated that further changes in values would be the driving force behind additional regulations dictating additional responsibilities for the firms.

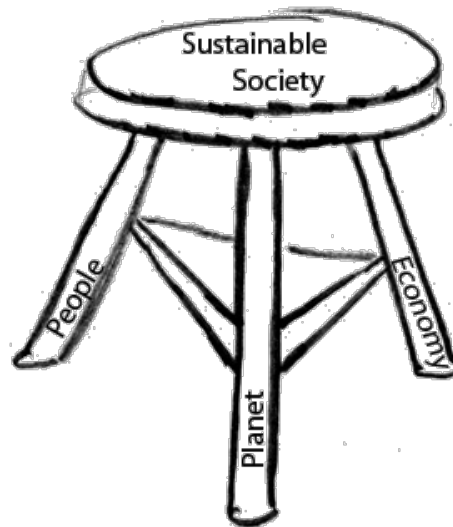
With the legal and market drivers pushing firms to engage in CSR, it follows that the reason for respecting regulations is to avoid fees and regulatory enforcement actions. But firms expressed concern about how best to engage in CSR while remaining competitive and profitable in the midst of with fundamental changes in markets. John Elkington's (1998) book, *Cannibals with Forks*, addressed this question. Elkington depicts the sustainability challenge as an unprecedented source of commercial opportunity for competitive companies. He portrays a new paradigm for seven drivers of change in the business mentality.

- changes in markets through competition; consumers will be observant of firm's TBL commitments and performance;
- observation of changes in social and ethical values, with less focus on economic values;
- transparency for social accountability in a world of hyper communications;
- life cycle technology, with emphasis on firm's product performance from cradle to grave;
- partnerships between companies and organizations from civil society;
- a different perception of time by the firms, suggesting longer planning and visioning horizons; and
- changing corporate governance, a more inclusive process in which non-traditional stakeholders help set companies' goals.

Elkington's paradigm seems to capture both the previous work on CSR and ideas from the Brundtland Report (WCED 1987). He re-states the need for firms to include social and environmental agendas in their planning, but he also recaptures the idea of attending to the needs of future generations through his focus on long-term planning. Also, the idea of pluralism proposed by WCED is reflected in the corporate governance driver. Elkington also reflects the

ideas of the U.N. World Commission on the Environment and Development when he uses the heuristic of three dimensions of sustainability. Elkington's 'triple bottom line' (TBL) refers to economic and financial prosperity (profits), environmental quality (planet), and social justice (people). In figure 4, from Elkington's book, the third leg is labeled Economy. However, he describes it as prosperity. Also, he holds that communities will have to understand that the TBL goals are to be met by working with business, rather than against it. This perspective places businesses as independent entities at the center of decisions, which implies a perpetuation of the old business model in which business and industry maintain an upper hand in relationships with communities. The other point missed by Elkington is the asymmetrical power relationship between large influential businesses and consumers involved in community organizations. Because the TBL involves a voluntary commitment from the firm, the level of accountability towards the surrounding community is likely to be very low. Absent benefits in terms of competitiveness, there is very little incentive for firms to implement the TBL without external enforcement or accountability.

Figure 4. Elkington's triple bottom line approach focuses on three factors: economic prosperity, environmental quality and social justice (Elkington 1998)



Nevertheless, Elkington's integration of business literature and SD literature expands the context of the contributions of (corporate) socially responsible businesses to society at large. However, the TBL has been openly criticized for the lack of measurements of its social and environmental components and the impossibility of aggregating across the three components (Norman and MacDonald 2004, MacDonald and Norman 2007). Norman and McDonald (2004) argue:

- Net income cannot be compared properly with the social or environmental bottom lines. The impossibility resides in the “open-ended nature of any attempt to make global assessment of a firm's social impact given the kind of data that would go into such an evaluation” (Norman and McDonald 2004 p 252).
- The social and environmental bottom lines seem vague commitments to social and environmental concerns and, because there is no way to calculate comparable

units of measure of the three lines, companies are worry free about comparisons across firms.

Indeed, the literature on the TBL offers no specifics about contributions to the social and environmental dimensions. But Pava (2007) suggests that the TBL cannot be blamed for the limitation of the business ethics movement for advancing ways to measure and track social and environmental performance in a meaningful, consistent and comparable way. Pava sees value in the TBL as a metaphor that reminds business academics and business people that corporate performance is multi-dimensional, as opposed to single bottom-lined (concerned only with profit maximization). While there is speculation that adoption of CSR and the TBL by large corporations may simply conceal old problems, growing awareness of corporate malpractice and the large impact that corporations have worldwide makes CSR, as business sustainability, an important part of discussions about sustainability.

D. Sustainable Development

The literature discussing the evolution and implementation of sustainable development (SD) is the largest body of knowledge in the field of sustainability²². Also, and more importantly, SD comes from a worldwide perspective to guide more recent notions of progress embodied in the work of international development organizations. In fact, SD provided a reorientation for development ideas that were previously dominated by modernization theory. This dominance faded during the early 1980s in response to strong criticism of its underlying discourse – the

²² See for instance the analysis of the exponential growth of the field in terms of publications and the number of contributing authors from different disciplines to the field of Sustainability and Sustainable Development made by Bettencourt and Kaur (2011).

value system in place reflected by the theory and methods of international development. The criticism was directed at international development broadly, regardless of widespread acknowledgment that development thinking was not a single paradigm as portrayed by some critics but, rather, a heterogeneous set of approaches both variable over time and highly diverse at any given time (Pieterse 1996, Simon 1997, Eisenstadt 2002). Recasting a discussion from the previous paper, some of the specific points of criticism included the following:

- Rostow's stages for growth (Rostow 1971) were rejected as a justification for implementing modernization. Especially problematic was the assumption that once societies acquired all conditions for the takeoff stage (stage 1), traditional societies would become homogeneous in their structural order.
- It became clear that the destruction of traditional societies did not necessarily translate into better societies; oftentimes it was shown that the disruption of traditional families, communities or political systems led to disorganization, delinquency and chaos rather than modern order (Eisenstadt 1974).
- Modernization was seen as ahistorical because it denied the importance of traditional elements and the history of "backward" societies. In this sense, non-western people were denied their own history. By extension, traditional knowledge was also dismissed in the process of modernization; the knowledge, technology and pattern of social institutions required by modernization are those from modern nations (Pieterse 1991).
- The attitudes of modernization were seen as a reflection of intentions to sustain the cultural hegemony of the West over the rest of the world (Pieterse 1991), also seen as a strategy to amass geopolitical power (Slater 1993).

- Michel Foucault (1926-1984) argued that the community of experts in the social sciences, with western values, set up the rules for telling the truth, which for him was another mode of social control. Foucault saw modernity as a global theory that was reductionist, universalistic, coercive and even totalitarian (Peet and Hartwick 1999).
- Modernism was seen as a way to create a simple world by reducing the cultural, social, and architectural diversity found across nations and hindering humans' abilities and imagination to cope with progress (Sachs 1992).

In summary, these traditional approaches to development promoted a type of progress that, for the most part, was designed from outside, ignoring local culture, social institutions, and the visions of progress of local people (Peet and Hartwick 1999). The aforementioned criticisms also combined with a wide spread discontent and disillusionment with the unfulfilled promises of development, in particular the loss of trust in economic growth as the state of the art answer to development. Modernization centered attention on economic growth (Eisenstadt 1974), which in turn was measured as gross domestic product (Neumayer 2000); oftentimes this metric, or income alone, was misused as a proxy indicator of wellbeing (Max-Neef 1995). Evidence that GDP was a poor proxy of wellbeing came from observations that, while economic growth around the world had been consistently rising, poverty was and is still rampant (Max-Neef 1995), and the inequality between rich and poor nations increasing dramatically since the post WWII period (Sachs 1992). Perhaps the most important focus of public concerns was the environmental problems associated with industrialization.

For these reasons, it was argued that modernity and its manifestation as development betrayed progress “by leading us into, preventing us from seeing, and keeping us from addressing

interwoven environmental, organizational, and cultural problems” (Norgaard 1994 p. 2). Booth (1985) and Simon (1997) described an impasse in development practice in the mid-1980s.

1. **Environmental degradation concerns in development thinking**

In his history of conservation and environmentalism, Nash (1976) described the rise in environmental awareness in the U.S., tracing it back to the works of John Muir (1838-1914), Gifford Pinchot (1865-1946) and Aldo Leopold (1887-1948), among others. A more recent work influencing the environmental movement was Rachel Carson’s (1962) message about the scale of negative impacts of pollution on the complex interactions of ecosystems. Easton (2007) recounted the effects of social pressures on the formation of national and international agreements to protect the environment from negative, unintended impacts of industrialization. In particular, the 1972 United Nations Conference on the Human Environment “marked the movement of environmental concerns into the world arena” (Nash 1976 p 307). As a result of this conference, a set of environmental principles was published as the “Declaration of the Human Environment” (United Nations 1972). These principles were intended to convince development decision-makers that environmental considerations should also be taken into account. Point six of the declaration summarizes its core message: “A point has been reached in history when we must shape our actions throughout the world with a more prudent care for their environmental consequences” (Nash 1976 p 309). This United Nations conference issued recommendations for governmental actions and led to formation of the U.N. Environmental Programme (Easton 2007).

Throughout the 1970s and 1980s a series of international conferences was held with the purpose of restating and expanding on the topic of environmental protection. A key conference was the

1982 Second U.N. Conference on the Human Environment because it led to the formation of the World Commission on Environment and Development. In 1987, this commission published the report “Our Common Future” (UN World Commission on Environment and Development 1987) in which SD was defined. The objectives for this commission were:

- *To propose long-term environmental strategies for achieving SD by the year 2000 and beyond;*
- *To recommend ways concern for the environment may be translated into greater co-operation among developing countries and between countries at different stages of economic and social development and lead to the achievement of common and mutually supportive objectives that take account of the interrelationships between people, resources, environment, and development;*
- *To consider ways and means by which the international community can deal more effectively with environmental concerns; and*
- *To help define shared perceptions of long-term environmental issues and the appropriate efforts needed to deal successfully with the problems of protecting and enhancing the environment, a long term agenda for action during the coming decades, and aspirational goals for the world community (UN World Commission on Environment and Development 1987)*

Thus, the birth of SD was marked by publication of “Our Common Future”, better known as the Brundtland Report.

Sustainable development was defined as “***development which meets the needs of the present without compromising the ability of future generations to meet their own needs***” (UN World

Commission on Environment and Development 1987). The report and the concept created a geopolitical-turning point about development stressed by the WCED²³ (Costanza and Daly 1992, Daly 1994, Baland and Platteau 1996). Despite a brief (and arguably imprecise) definition, SD became a convincing cause because of its appeal to reorientation of the greatly criticized traditions of progress. It called for actions to reduce the negative impacts of economic growth on the environment and for thinking in terms of finite resources and long-term survival. Nevertheless, the brief definition of SD offered little direction for implementation. Thus, subsequent debates focused on the search for more advanced interpretations to guide implementing SD.

Considering the initial objectives for the World Commission on Environment and Development, it is not surprising that the SD of this period was for the most part defined largely as development complemented by sound actions to protect and preserve natural resources and the environment. Traditionally, development meant economic development. Therefore, the linkage made between economy and environment in the understanding of SD could be expected. It seems simplistic to point out such a linkage in light of greater understanding and acceptance of human dependence on environmental quality; however, only 30 years ago this linkage represented a major reorientation of development thinking. The discussion of SD expanded the understanding of progress by drawing attention to the contributions of the environment to the satisfaction of

²³ The WCED listed as common challenges: population growth and improvement of the human resource base; maintaining the potential of food security for every nation; protection of species and ecosystems; creation of environmentally safe and sustainable energy sources; industrial transformation to produce more with less; and addressing the adequate management of urban growth.

basic human needs. Therefore a major part of the reorientation was the focus on reparation of environmental damages caused by industrialization, without losing focus on reduction of poverty and increases in education, access to health services, and the guarantee of basic human freedoms (Pearce et al. 1990). The notion of SD was not without its critics. SD was seen by some as an oxymoron in the sense that development, understood as constant economic growth, was impossible to sustain indefinitely with a finite resource base²⁴. Assimilation of the ideas proposed by WCED and changes to traditional perceptions of development were not immediate.

2. Reinforcement of social aspects for development theory

The significant focus on ecological and economic matters in discussion of sustainability during the 1980s seemed to leave unattended the social dimension of SD. Yet, the central thesis from WCED (1987) for social sustainability is that social systems are interdependent with ecological systems. The Brundtland Report highlighted the importance of matters of social equity and justice, arguing that because of greater human interdependence it was best for society's common interest that development decisions be made in a way that empowered vulnerable groups. In addition, it was observed that development should enhance people's choices and should develop human capabilities such as knowledge. However, this discussion and associated recommendations in the report initially received less attention than the idea of integrating economic growth and environmental concerns and were directed at people in developing nations. Eventually the recommendations about social equity and social justice became a more prominent focus of SD, and subsequent publications of United Nations Development Programme reinforced

²⁴ See for instance Lelé (1991)

the social dimension, especially in the first Human Development Report (United Nations Development Programme 1990).

The Earth Summit Conference (United Nations Commission on Sustainable Development 1992) examined the relationship between human rights, population, social development, women and human settlements and restated the need for environmentally SD. The result of the conference was Agenda 21 (UNCED 1992: paragraph 23.2), a document which explicitly argues that one of the fundamental prerequisites for the transition into SD is broadening public participation in decision-making. The document recommends new forms of participation that should involve individuals, groups and organizations in decisions, particularly those decisions that potentially may affect the communities in which they live and work.

This statement from the United Nations challenged traditional ideas that, because SD is a highly technical matter, implementation should be left to scientists who should define priorities, the necessary metrics, and the required actions (Portney 2003). The Agenda 21 report suggested pluralistic and inclusive approaches for these tasks. These recommendations are consistent with recent theories suggesting that the formation and maintenance of social institutions is of utmost importance for community development because the process of public engagement enhances the social capital upon which civil society, governance and government rest (Fukuyama 2001). From a practical standpoint, many of the elements of SD contained within the social and environmental dimensions fall into the public domain because they pertain to common interests. Thus, for SD policies to become effective, public approval and support would be required. Otherwise, SD policies designed in technocratic isolation risks a lack of public support (Randall 2002). In

addition, matters of social justice (equity) became key for sustainability; for this more expansive and inclusive policy-making approaches were needed; Furthermore, these policy decisions ought to take into account the judgments, and therefore values, of local citizens. If sustainability issues were only of technical or scientific concern, then society would not still face persistent problems²⁵ that were said to be well understood by the scientific community, but nevertheless remain unresolved (Portney 2003).

3. **Dimensions of sustainable development**

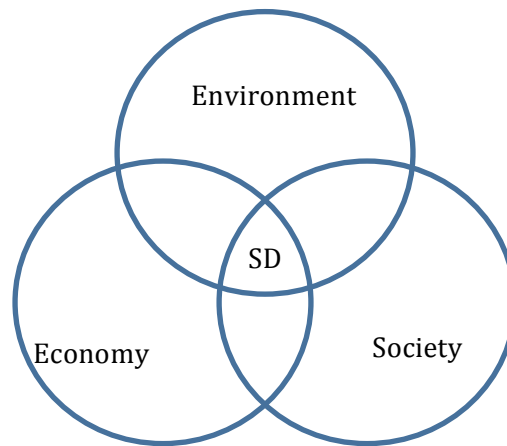
SD was framed as multidimensional, in contrast to the linear thinking of modernization's economic growth. It was understood to have at least three dimensions that should be attended to for human development: the economic dimension, with elements such as the traditionally dominant GDP indicators; the environmental or ecological dimension; and the social dimension. A diagram of three overlapping circles was used to illustrate the three dimensions. The origin of the three-circle diagram is unclear. Connelly (2007) traces its origins to International Centre for Local Environmental Initiatives (ICLEI) published in the early 1990s. However, earlier versions of this representation are found in the sustainable agriculture literature (see Figure 5).

Whatever its origin, the three circle diagram captures a powerful metaphor in the way it communicates the interrelated concerns of development policy, suggesting a holistic scope and integration across the three areas (Connelly 2007). It also helped to explain the systemic nature

²⁵ Pollution levels, overconsumption of natural resources, strong inequality in the distribution of income and services (within countries and across rich and poor nations); poverty levels, and social conflicts.

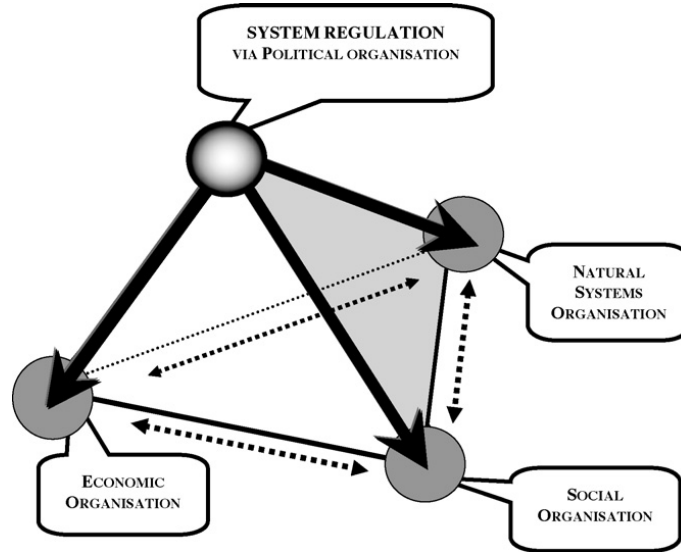
of SD (O'Connor 2006). However, the dimensions defined by the WCED lacked specificity, and the idea of overlapping dimensions was merely a heuristic to explain what “ought to be”.

Figure 5. The three circles of sustainable development (Source: ICLEI 1996, cited by Connelly 2007)



In furthering the theory of these dimensions, O'Connor (2006) included an additional sphere to the schematic diagram representing political organizations (Figure 6). In this political dimension, O'Connor suggests the inclusion of conventions, rules and institutional frameworks for the regulation of the other dimensions. These organizations provide the regulation required for resolution of conflicts arising from tradeoffs, due to conflicting or incompatible choices, among the economic, environmental and social dimensions.

Figure 6. The four spheres: framework for sustainability (Source: O'Connor 2006)



The actual number of elements (dimensions) of SD has been the subject of considerable attention by different authors. Bettencourt and Kaur (2011) analyzed the evolution of the field of sustainability and SD (they used the terms interchangeably) and showed exponential growth in the number of publications and contributing authors from different disciplines, dominated, however, by contributions from social sciences, biology, and chemical, mechanical, and civil engineering.

Despite the attention, there is not a unifying theory for SD. In an effort to identify the critical elements of SD, Alkire (2002) conducted a meta-analysis of the dimensions of human development, intended to clarify what it means to say that development is multi-dimensional. More than just finding meaning, she intended to give epistemological footing to these dimensions. Working toward a synthesis of different sets of dimensions from different authors, however, Alkire recognized how these dimensions were biased towards western notions of progress and too general to apply to a specific context and timeframe. Ultimately, Alkire

abandoned the idea of coming up with a list of “universal” dimensions in favor of suggesting a larger appreciation of how dimensions of development should be specified; for her, the appropriate process for specification of these dimensions should not be a traditional expert-driven process but rather should be collaborative, visible, defensible and revisable.

E. Towards a Common Understanding of Sustainability

The way that three separate fields of study constructed the concept of sustainability raised the question of whether finding common ground across them will help the advancement of implementation. The point of this section (and this paper) is that the advancement of sustainability requires a common understanding to translate knowledge into coherent actions. As noted above, considerable work has been done looking at the general concept of sustainability beyond a specific focus on agriculture, business and development (Bettencourt and Kaur 2011), adding even more assumptions about elements of importance.

As for motivation to make the changes in the human trajectory that are required for sustainability, Prugh, Constanza and Daly (2000) raise concern that most books about sustainability are written with emphasis on crisis, revealing the ills of society and providing scenarios of impending disaster. This is especially true when discussions of sustainability focus principally on the environmental dimension, which makes direct reference to transforming the dominant model of growth and associated high levels of consumption and waste. Social and economic motivations may better align with Frederick’s view (2013) that social transformation is justified based on notions of linear progress over time (e.g., from poverty to riches), which in turn stimulates normative visions of a better future in which social instability, inequality and poverty are overcome.

Although sustainability is portrayed as a set of technical and methodological solutions to pressing matters, a deeper look indicates that it is a lot more about the expression of certain social motivations that can be ethically defensible (Bawden 2010) or ethically justifiable (Blatz 1992) in the current context of the world. Orr (2002) took a broad look at the issue and concluded that “the dialogue about sustainability is about a change in the human trajectory that will require us to rethink old assumptions and engage the large questions of the human condition that some presume to have been answered once and for all”. The assumptions that ought to come into question are not only disciplinary or methodological, but also about the values sustaining motivations. Bawden (2010) discusses the point made by Vickers (1983) in which he argues that defining what is wrong or right will require the integration of value judgments into the appreciation of our systems. An old idea perhaps, but it is not clear in the process of implementing sustainability.

1. The same heuristic does not imply the same meaning

Each area of work discussed in this paper, structured sustainability with more or less the same dimensions: the environment, society and the economy. The use of these heuristics has proven useful, but it has also resulted in a high degree of abstraction. As a result, there is a tendency to understand sustainability by drawing from all fields regardless of fundamental differences among them. This phenomenon is an example of “the fallacy of misplaced concreteness” (Daly, Cobb et al. 1994). Within each area of focus and associated fields of study, and within each of the three dimensions, there are ethical principles of sustainability and associated recommended actions. These principles and actions, however, vary widely across the fields; as a result there is great

variability in views about how sustainability ought to be implemented, depending on which frame of reference is applied.

Benefiting from the knowledge about sustainability gained in each of the three areas does not mean assuming that they are the same. Despite some similarities, sustainability means different things for SD, corporate social responsibility and sustainable agriculture. Consider one example of efforts to combine work under the assumption that the intentions of each are the same.

“The concept of sustainable development was launched by the WCED as a ‘global objective’ to guide policies orientated to balance ‘economic and social systems and ecological conditions’. It is often represented with the ‘triple bottom line’ of economy, environment, and society (Elkington et al. 2007, p. 1). A sustainable development ‘triangle’ formed by People, Planet, and Profit (the three Ps), with Profit sometimes replaced by the more moderate ‘Prosperity’, is common use in business and governments (European Commission 2002). The term ‘sustainability’ is considered a synonym of sustainable development although, as pointed out by Dresner (2002), some distinctions between these two concepts can be identified.” (Seghezze 2009)

Combining knowledge about sustainability at the level of heuristics cannot be accepted as a shared understanding of sustainability. Beyond the obvious focus on three dimensions, there are significant differences between the triple bottom line and the framing of SD, not only in terms of the scope of analysis and the reach of sustainability, but also at the foundational level. The triple bottom line is based on the doctrine of corporate social responsibility. At the core of CSR there

are reservations about the extent to which businesses are duty-bounded to norms outside the business realm. Consider, for example, Milton Friedman's 1962 argument that given clear "rules of the game", the only social responsibility of business is to use its resources and focus on activities to generate profits (Friedman 2007). This type of thinking weakens the moral obligation that CSR proponents try to instill into business. But it also reveals that, in reality, businesses face no clearly articulated obligation to care for the improvement of quality of life for society at large; this is optional. In contrast, SD is about the need to create policies that would increase per capita income as a poverty relief strategy. The goal is not only a growing economy but also a more egalitarian economy, an obligation that every nation has towards its own population.

The contrast between the three constructs of sustainability is summarized in Table 2. It is understandable that, for some, moving the concept of sustainability forward by reconciling differences and combining meanings across fields of study is desirable. Yet, these efforts may in fact ignore or conceal key differences. Seeking commonalities in shallow layers of the different focuses on sustainability may hinder implementation if actions with divergent intentions pose challenging trade-offs that would ensue long standing debates. The advancement of sustainability would be better served if understanding across fields were reached through the use of criteria that allow for combination of different meanings at deeper levels of motivation. Independently of the type of sustainability, the scale applied to the system under observation illustrates another inconsistency of the different framings, specifically the incongruences among local, regional, national and worldwide initiatives.

Table 2. Examples of foundational differences between constructions of sustainability

Sustainable Agriculture	Triple Bottom Line (as more advanced version of CSR)	Sustainable Development
Social dimension refers to the rural life linked to agriculture. In some instances this notion of rural life style extends to the preservation of desirable family, work and community life values.	People refers to matters of justice in labor and markets (e.g. fair trade); in expanding the corporate stakeholders to include not only investors but also all employees, and customers at large. Also, in promoting fairness, safety and harmony at the working place. In approaching markets with more considerations to consumers concerns for others and the environment.	Social dimension refers to efforts to exercise justice at the community level in matters or race, labor, gender; in seeking equity in the distribution of resources; in raising the community's culture, knowledge, education and living standards.
Economic dimension touches on the profitability of farmers, and the role of agriculture production in the national economy.	Profit refers to a matter of making profit while taking advantage of the social awareness of corporate malpractices to differentiate the firm by showing compliance and conformity with new value system.	Economic dimension refers to macro-economic strategies that would positively impact the interaction between the private sector and people, and also the one between business and the environment.
Environmental dimension refers to the surrounding environment of the agricultural system. Water quality, soil fertility / conservation, air quality, are both suppliers of inputs for agricultural production and receivers of negative or positive impacts.	Planet refers to consideration for the negative impacts that the actions of the firm may have and a willingness of the stakeholders to comply with environmental regulation and compliance with social norms.	Environmental dimension, protecting natural resources base and the environment for human health, biodiversity conservation and productivity.
<i>Involves altruistic, biospheric, intrinsic, utilitarian and instrumental values.</i>	<i>Involves mostly utilitarian and instrumental values.</i>	<i>Involves altruistic, biospheric, instrumental and utilitarian values.</i>
<i>The scale used covers the defined agricultural system which can be very large but the elements involved are only those related to agriculture (e.g. urban matters may be left outside the analysis)</i>	<i>The applied scale encloses a firm or a sector of the economy. However, there are some innovative uses of TBL applied to community level but these uses overstretch the concept to include elements pertaining to SD</i>	<i>The scale of the system under observation is national or regional</i>

2. Caution about taking a stance using only one construction of sustainability

The challenges of shallowly interpreting the multiple understandings of sustainability to be the same create conflict at the level of practice. Even in closely related fields there is not broad agreement in terms of practices. For instance, Knauf (2014) analyzes two current lines of discourse in Germany on sustainability, both with high relevance for the forest-based sector: strong sustainability²⁶ and sustainable building (environmental standardization in the German building sector). The analysis shows that each discourse has developed and established diametrically different meanings of sustainability.

It would be a mistake to assert that there is one correct understanding of sustainability. The challenge resides in how to combine the multiple contributions. There are many reasons why finding commonalities is important, for example finding synergies among fields participating in a process that is consistent and commonly understood across disciplines. These synergies are properties of the systems. Thompson (2007) refers to Richard Bawden's statement that for the most part systems are heuristics and they are unreal. One way to interpret this statement is that systems are constructed by actors and bounded by the reach of their strategic plans or availability of resources. In this case, it does matter greatly whether the actors have a common understanding of principles because the system construction depends on the capacity of actors to combine their

²⁶ As understood in environmental and natural resource economics theory, strong sustainability implies that, in a context of constant benefits generated by capital, substitution of man-made capital for natural capital should be limited and that future generations have the right to enjoy the same benefits from natural capital available for the current generation (Tietenberg 2000).

knowledge over a set of commonly understood principles²⁷. Without this common understanding there is a risk of oversight of some systemic properties and synergies.

3. **Find commonalities at the motivational level**

If members from sectors across society or a community gather to define plans for progress, how can they understand each other if each brings an understanding of sustainability that comes from a different theoretical paradigm? When practices recommended by a particular discipline are accepted and their virtues praised without questioning basic assumptions, then the original value-laden assumptions are also taken as given. This suggests that pursuing sustainability by focusing on which practices from different fields qualify as sustainable is problematic because at their origin the fields arise from potentially divergent values. Thus, rather than comparing practices and debating over which constitute sustainability, a closer look at basic value motivations may contribute to advancing the implementation of sustainability.

A more general framework for analysis is found in Norton (2005) formulation of sustainability in which he gives a definition of sustainable activities, characterized as those “that can be carried on in the present without negatively impacting the range of important choices that should be left open to the next generation” (Norton 2005 p 432). This provides a general understanding that

²⁷ As an example one can think of the interaction of elements and synergies that can emerge in a scenario where a local initiative promotes the use of genetically modified crops for nutritionally complete cereal to benefit the world’s poorest people, such as the case of transgenic corn (Naqvi, S., et al. 2009). This initiative may be acceptable from an altruistic perspective; it may not be so for those with biospheric values interested in the preservation of traditional genetic diversity, nor for those concerned about the uncertain effects of transgenic crops on human health and the environment.

actions for sustainability should aim for the indefinite continuity of a system. But it also expresses the idea of choices, rather than needs or wants as in the definition of SD. Choices imply individual and social preferences that entail value judgments; this is a more advanced stance than thinking about needs, which implies basic necessities for which sometimes there is no choice (e.g., food). When thinking about preferences, values are key because they serve as standards or criteria for the evaluation or selection of actions, policies, and events (Schwartz 1994). Kennedy (2007) defines sustainability as the technical management of resources in such a way that their contributions to human welfare are *conserved or improved for succeeding generations*. Like Norton, Kennedy considers future generations. Even though Kennedy refers to technical matters, the idea of preferences prevails in the sense that technical advances may be offered as solutions when environmental amenities are depleted by human actions.

Rather than a choice from among a set of actions, focusing on the proposition that sustainability encompasses principles that in turn depend upon preconceived value judgments (Bawden 2010, Raffaele et al. 2010) offers a less conflicting scenario for agreement. More reasons to think of values as the departure point for any sustainability initiative are given by Prugh, Costanza et al. (2000). These authors argue that the most important dimensions of sustainability are cultural and political. One of the reasons for this is that society has entered a phase of “post normal science” (Funtowicz and Ravetz 1993) which implies a different relationship between experts and all other stakeholders. As a result, the politics to address sustainability problems are more important than any technical expertise (Prugh et al. 2000). Similarly, Orr (2002) argues that the barriers to the transition to sustainability are social, political and psychological rather than technological. If decision-making about the trade-offs posed by multiple understandings is brought to a level of

values, the field of decision may become less convoluted. This may sound like a simplification because the same actions may invoke different values. But values can be considered according to their motivations.

4. **Motivations for sustainability actions are axiological**

As reviewed in previous sections, different framings define and construct sustainability with different elements that lead to inconsistent implementation. The key to overcoming these inconsistencies is to find a significant overlap among understandings of sustainability based on the values invoked by each framing, or at least, to take a closer look at the process that enables the expression of those values. Based on the epistemologies that define sustainability, it is observed that the similarities of the heuristics used hide different underlying values. Given this fundamental disagreement among fields of sustainability study, it may be that axiology can contribute to the development of a broader framework that would generate consistent understanding prior to implementation.

Norton (2003) expressed concern about whether using a set of basic principles to guide moral decisions is an integration or a reduction of options for decision-makers. Narrowing from a set of principles to a set of values could be viewed as a step backward for those observing that sustainability actions may invoke multiple conflicting values. However, history shows that a larger focus on values provides for an expansion of the basic foundations that previously guided ideas of progress. In the past, a great number of decisions related to development were made based on a reductionist value-laden criterion. For instance, Berkes and Folke (1998) described that much of the poor management of ecosystems and the failure of resource management were the result of the laissez-faire ideology promoted by mainstream economic theory and its primary

focus on utilitarian values. Topics such as environmental valuation and discounting are examples of the application of utilitarian values alone. This dominance of an extreme simplification of values was seen by Norton (2003) as a moral monism pervading social and environmental policy. On the other hand, Norton also warns that monism is also embraced by environmental ethicists that focus too much on the intrinsic values of the environment, while somehow negating the importance of anthropocentric values in the great order of things. He concluded that an integration of pluralistic principles using an expanded underlying value theory is necessary, while integrating pluralistic environmental principles across different dynamics. This argument is a point of reference that may well be used as the base to expand attention to value systems in developmental decisions.

5. Values as motivation in sustainability policy

Sustainability has an inherent ethical dimension that has been neglected (Easton 2007, Becker 2012). The practices suggested as sustainability, indeed any practice, can be motivated by one or more values. The dominant social paradigm prior to the emergence of sustainability emphasized individualism, materialism, limited government, economic growth, and the importance of modernization at the core of progress (Oskamp and Schultz 2005). Sustainability invokes through its principles an extension of those values and includes values like those emphasized by the New Environmental Paradigm (NEP). This new paradigm “emphasizes beliefs about the delicate balance of nature, the limits of growth, and humanity’s need to live in balance with nature rather than to rule it” (Oskamp and Schultz 2005 p 451).

Though sustainability challenges the established value system, it remains highly normative; therefore any recommended action requires deliberation and prioritization in the process of

implementation. But, because multiple values are invoked, this type of discussion at the level of action might create decision gridlocks or endless debates, or even worse, implementation of policies that are believed to serve one purpose but end up serving others. In other words, decisions on policy actions may take different routes depending on the values that come into play. One can see how difficulties in decision-making would be exacerbated when similar sustainability actions from different interpretations of sustainability are debated. The alternative is to carefully examine the values that underlie the actions. By definition, a value “is an important life goal or societal condition desired by a person” (Oskamp and Schultz 2005). Considering that values are usually broad abstract concepts (e.g. beauty, happiness, justice, freedom), and because values influence the views people hold over contested matters such as religion, democracy, freedom, justice, equality and others, it is worth exploring how values influence decisions.

Using the classification of values made by Schwartz (1994) (see table 3) is one way to explore the association of values with principles of sustainability in order to exemplify the type of values that influence sustainability actions. Schwartz’s categorization has been used by Dietz, Fitzgerald et al. (2005) and Oskamp and Schultz (2004) to explain environmental values or environmental attitudes. Most environmental attitudes fall into a category of values that is also associated with social justice, equity or care for others, thus this categorization is also applicable to the social and economic dimensions of sustainability.

Table 3. Motivational types of values. (Source: Schwartz 1994)²⁸

Openness to Change: Self-direction, Stimulation and Hedonism

Hedonism: Pleasure and sensuous gratification for oneself.	Pleasure, enjoying life
Stimulation: Excitement, novelty, and challenge in life.	Daring, varied life, exciting life
Self-direction: Independent thought and action-choosing, creating, exploring.	Creativity, curious Freedom

Self-Transcendence: Universalism, Benevolence

Universalism: Understanding, appreciation, tolerance, and protection for the welfare of all people and for nature.	Broad-minded, social Justice, equality Protecting the environment
Benevolence: Preservation and enhancement of the welfare of people with whom one is in frequent personal contact.	Helpful Honest Forgiving

Conservation: Security, Conformity, Tradition

Tradition: Respect, commitment, and acceptance of the customs and ideas that traditional culture or religion provide.	Humble, devout Accepting my portion in life
Conformity: Restraint of actions, inclinations, and impulses likely to upset or harm others and violate social expectations or norms.	Politeness, obedient Honoring parents and elders
Security: Safety, harmony, and stability of society, of relationships, and of self.	National security Social order, clean

Self-Enhancement: Power, Achievement and Hedonism

Power: Social status and prestige, control or dominance over people and resources	Social power Authority Wealth
Achievement: Personal success through demonstrating competence according to social standards.	Successful Capable Ambitious
Hedonism: Pleasure and sensuous gratification for oneself.	Pleasure, enjoying life

²⁸ Schwartz (1994) tested this theory on 64 countries include two African, two North American, four Latin American, eight Asian, two South Asian, eight European, one Middle Eastern, 14 European, two Mediterranean, Australia and New Zealand.

One can argue that important principles of sustainability such as intergenerational equity, care for others, care for the environment, appreciation of the intrinsic value of nature, and social justice fall into the categories of universalism and benevolence. If this is the case, then those values are to be prioritized in the decision making process. However, a closer examination of the principles of sustainability shows multiple associated values and not necessarily all would serve humanistic (altruistic) purposes that sustainability is expected to satisfy. In other words, embracing these principles may suggest embracing different values.

Take for instance the SD principle stating that “industrial production: higher productivity, increased efficiency and decreased pollution” shall be conducted. This principle involves highly contested matters related to models of production and consumption, as well as the relation of business with society at large. WCED suggested that without economic growth there is no SD; how might this principle become actionable under different values? Values associated with power for self-enhancement motivate firms to become efficient. Yet, highly efficient businesses would find little incentive to incur costs by providing additional benefits to employees (for better distribution of wealth) or to incur high costs of pollution abatement. On the other hand, when motivation comes from security values, bad employment conditions and pollution problems may generate social instability and damages to regional natural resources, outcomes viewed as hurting the ability of the firm to operate. If, however, universalism values motivate policy design to protect workers or environmental quality, firms may find incentives in the form of regulations. In other words, the rules of the game for the industry would be changed.

The list of principles of sustainability can be extensive (see the appendix for a complete list of principles), so the types of values invoked will be as well. However, for stakeholders facing multiple possible actions, coming to an agreement on the types of value(s) that should underlie each particular policy clarifies and provides a context in which actions can be combined more coherently. Even if stakeholders have to work hard in collectively sorting through multiple values invoked and then deciding on priorities, this process should be less conflict-laden than debating over actions while motivational values remain obscured.

Working at the level of values is not expected to be conflict free; even at the level of values, issues can be presented as trade-offs. Schwartz (1994) discusses how the pursuit of certain actions in response to one motivational value may conflict with other values. For instance, the pursuit of achievement values conflicts with actions related to the enhancement of other's lives or to notions of equity, in other words, having to give up individual interests for the good of community interests. By the same token, actions related to values of tradition conflict with actions related to stimulation values; "accepting cultural and religious customs and ideas handed down from the past is likely to inhibit seeking novelty, challenge, and excitement" (Schwartz 1994 p 23).

F. Values differences and a minimum standard for sustainability

Clearly, different groups have their own visions of what sustainability entails. In the process of articulating those visions, and the motivating values, sustainability loses its technocratic character and becomes a matter of the people. There is of course a part of identifying and implementing actions that would continue being technical, but the selections of "things" that any group or community wishes to transform is more an ethical consideration. But the fact that

different groups exhibit different values and different visions should not mean that sustainability is whatever anyone wants it to be. After almost thirty years of debates and discussions about the meaning of sustainability, involving academics and stakeholders from multiple sectors, there should be a degree of consensus about a set of minimum criteria that should be met to define sustainable actions. These criteria should be used to evaluate whether a group is moving towards sustainability or not. If any group implements anything and calls it sustainability, then sustainability becomes all and nothing.

Therefore, despite the absence of generally accepted value-laden criteria to determine whether a practice can be deemed sustainable or not, the acceptance of sustainability also implies the acceptance of some general norms that are more or less recurrent in most propositions of sustainability practices. These norms suggest standards of sustainability or core conditions for sustainability.

- Seeing how different fields of knowledge construct sustainability and that different understandings of sustainability invoke different values, the importance of combining different sources of knowledge in sustainability planning and implementation is clear, because greater participation and representation adds to the understanding of the system under observation. Conversely, it should not be accepted that a community implementing sustainability would commit only to one type of sustainability because this shortens the breadth and depth of the effort. There are communities developing sustainability initiatives based solely on the triple bottom line literature. This restricts their ability to benefit from other knowledge that would help in crafting their sustainability vision,

broaden their scope of analysis, and expand the variety of principles they could decide to implement. Similarly, a community basing its work solely on principles of sustainable agriculture could overlook principles related to urban-rural interactions; considering SD principles could help the community realize opportunities from better integration into the large system of which they are a part.

- All sustainabilities discussed in this document embrace, to some degree, a systems perspective. It follows, then, that communities working on sustainability benefit from recognizing that they are not islands. Every community interacts with others in some way, depending upon other communities and upon the nation as a whole. Therefore, consideration of the interactions among communities and with the region should be part of sustainability visioning and planning. Communities focused only on their wellbeing are working on an incomplete system. Absence of this systems perspective risks the “tyranny of small decisions”.
- Different authors use different words to express ideas similar to Bawden’s (2010 p 24) description of sustainability as the “capacity of any system-of-systems to maintain itself (or to be maintained) into the future”. Another minimum standard involves long term planning and attention to intergenerational impacts.
- Finally, communities or stakeholders engaged in sustainability initiatives should be clear about the values that they want to serve with any given action and about the diversity of values they ascribe to sustainability. In particular, universalism and benevolence (see

Table 3) are core value because they underlie actions to benefit the community at large and the surrounding environment.

One additional point remains. Sustainability is about the big questions of progress and the exercise of values such as fairness, social and environmental justice, and equity, with the purpose of enhancing quality of life and the indefinite perpetuation of society. Since these are macro issues that fall into the domain of non-totalitarian types of government that allow for the expression of freedoms, sustainability is strongly associated with democracy. However, democracy is not seen as a necessary condition for sustainability because the indefinite perpetuation of society and the wellbeing of society could be achieved by means other than democracy (e.g. the benevolent dictator).

G. Conclusion

This paper explored the contributions from three dominant fields of sustainability studies and how this knowledge contributes to a broader understanding of sustainability. Additionally, the argument is made that implementation of sustainability is complicated when it devolves to a selection from among a set of practices associated with different fields of sustainability. The key points made are:

- Regardless of apparent similarities, heuristics used to explain sustainability across fields of study and the principles generated from these heuristics reflect underlying values that can be incompatible, which causes inconsistencies that affect implementation. Therefore caution is warranted for efforts to combine knowledge about sustainability at the shallow level of heuristics. This is more critical when combining sustainability practices from different fields of study.
- Combining knowledge is desirable, but debating at the level of practices that stem from principles (across and within fields of study) may create gridlock in decision-making. Bringing the debate one level deeper from practices to values helps to shed clarity on the purpose of the practice and may facilitate deliberation.
- As hard as it is to agree on values, being explicit about what values a group or community wishes to serve with every action within sustainability plans (part of the rationale for each action) could reduce conflict.
- A set of principles, drawn from these fields of study, is sufficiently universal that they can be deemed minimum standards for labeling an initiative sustainable. The standards are born of the three fields of sustainability studies and emerge as characteristics of sustainability.

How communities actually implement sustainability is part of a larger question that emerges from this discussion. However, evaluating sustainability in terms of value judgments involves highly contested methods, long-term studies and large samples. Such evaluations will be rare. Meanwhile, many communities are already engaged in taking steps towards sustainability. But how do they understand sustainability? And how is that reflected in their plans? These are among the questions addressed in the next paper.

CHAPTER 3 - Interpretation and Implementation of Sustainability with Community Sustainability Indicators

A. Introduction

An increasing number of communities using sustainability indicators are setting national trends for community development planning. Advocates of these indicators argue that community sustainability indicators (CSI) are clearly different from national-level indicators (such as GDP) in that they are constructed from the grassroots upwards in a deliberative process and capture broader measurements of the elements that generate social welfare (Reed, et al. 2006, Smolko and Redefining Progress 2006). These indicators are regarded as sustainability indicators because of their use by communities to track progress along locally identified sustainability trajectories.

However, there are still questions about the extent to which community efforts are guided by theories of sustainability. Sustainability has been debated for over three decades, and from these debates several constructions of sustainability have emerged. From these, different heuristics are used to reflect the dimensions of sustainability, and in almost all constructions economic, environmental, and social dimensions are found (Altieri 1987, UN World Commission on Environment and Development 1987, Carroll 1991). From these dimensions principles are suggested for implementation; these may include attention to moral obligations to future generations, social justice, broader understanding of social wellbeing, the enhancement of society, time and geographical scales, systemic-approaches, environmental justice, and attention to nature's carrying capacity (Norgaard 1994, Arrow, et al. 1995, Folke, et al. 1996, Costanza, et al. 1997, Berkes, et al. 1998, Dresner 2002, Lawn 2006) . These principles invoke a value system that both contests and complements the dominant utilitarian value-system that has been highly influential in community development works. However, regardless of how compelling

theoretical recommendations for implementation may be, communities may or may not incorporate them in their community sustainability plans. Consistency between theoretical constructions of sustainability and empirical applications has not been thoroughly assessed. Given the breadth of treatments of sustainability in the literature, studying communities' use of sustainability indicators represents a unique opportunity to learn how communities interpret and implement sustainability in their own development plans. Better understanding of community-level efforts may inform refinements in theory and provide insights about limitations and advantages for implementing sustainability.

This research addresses three questions about communities' development and use of sustainability indicators: 1) What types of community sustainability indicators are found across community sustainability efforts? 2) Based on communities' visions of progress, what constitutes sustainability for them? 3) How do their interpretations of sustainability compare to those from theoreticians' interpretations in the literature?

For this research, 20 sets of indicators from Community Sustainability Efforts in the U.S. were collected from electronic databases. An analytical framework developed by the author is used to contrast broad categorizations of sustainability to evaluate the level of attention to dimensions of sustainability. At the same time, critical characteristics of these indicators are evaluated. Characteristics include, whether the indicators are isolated measures or combined measures that reflect dynamics of the system. This research seeks to make a contribution to the body of literature for indicators through a general analysis of community sustainability indicators and comparison of the fundamentals of the practices with global theories of sustainability.

B. Communities Implementing Sustainability with Indicators

An approach to observe changes conducive to sustainability is the creation of metrics for the principles associated with the concept. Where metrics exist, indicators may serve as the means to analyze information that can be indicative of movement towards sustainable trends (Victor 1991, Segnestam 2002, Phillips 2005, Lawn 2006, Bell and Morse 2008). The proliferation of **Community Sustainability Efforts (CSEs)** using **community sustainability indicators (CSI)** across the United States of America reflects the actions of several groups participating in alternative ways to measure progress under the overarching concept of sustainability.

Communities implementing sustainability are at the cutting edge of the advancement of this concept. Their work contradicts traditional notions of community development that would view sustainability as a highly technical matter and its implementation best left to scientists (or experts) who would define priorities, the necessary metrics, and the required courses of action (Portney 2003). Under the reasoning that sustainability should be left in the hands of experts, sustainability indicators such as the genuine progress indicator have been suggested (Cobb, Cobb et al. 1994, Daly, Cobb et al. 1994, Neumayer 2000). However, Portney (2003) argues that if sustainability issues were only of technical or scientific concern, then society would not still face persistent problems that are well understood by the scientific community but nevertheless remain unresolved. Regardless of how influential national-level indicators have been in policy decisions, they are not widely accepted nor frequently used as decision-making tools at local levels. This is because national level indicators are constructed through a top-down approach and do not respond directly to local needs. Also in many cases local decision-makers do not understand the purpose of these indicators or how they are created (Innes and Booher 2000).

Much of the appeal of CSEs is that they seem to fulfill the pluralistic requirement for sustainability. As the argument goes, sustainability requires a pluralistic and inclusive approach because in the process of planning for sustainability, the formation of these groups fosters the creation and maintenance of new social institutions (UN World Commission on Environment and Development 1987, Randall 2002, Norton 2005, Bell and Morse 2008). Social institutions are of utmost importance for sustainability to enhance the social capital upon which civil society, governance and government rest (Fukuyama 2001). Social capital in this case is not only important for representativeness but also to create an egalitarian decision-making process. Thus community efforts that implement sustainability are expected to work in a pluralistic context that allows for public participation. Community-led efforts may be conducive to more effective policies because they would receive public approval and support from conception; the creation of sustainability policies in technocratic isolation risks a lack of public support (Randall 2002). Another interesting feature of CSEs is the creation of a space for the exercise of values other than the utilitarian values exercised in a market economy. Examples of other values expected to be expressed in these settings are environmental and social justice, in the form of more expansive and inclusive policy-making methods that take into account local citizens' concerns for others and for the environment.

In constructing Community Sustainability Indicators (CSIs), local stakeholders express their own understanding of social welfare through the identification of key elements that will be monitored with the indicators. Local actors work together with local governmental agencies to fill in technical gaps that may occur when there is information that local actors do not have (Phillips 2005, Smolko and Redefining Progress 2006). The method of constructing community indicators

is said to be highly participative, producing indicators that measure what is of interest for local community members. Because of this, community indicators are oriented toward the measurement of broader elements that generate wellbeing²⁹, departing from only observing standard economic measures that emphasize the generation of welfare in monetary terms and disregard (by design) other elements that contribute to the wellbeing of society (Hecht 2005).

When implementing sustainability in a pluralistic context, the meaning of sustainability goes beyond the pure technical understanding of endurance of a system to also become a space for social enhancement given by the exercise of values that society renders as important for higher quality of life. Examples of those values are: justice, fairness, freedom and ennobling (Thompson 2010). The moral stance for sustainability derives from a “general obligation we have to respect and secure the rights of future generations” (Burkhardt 1989 p 114) and because we ought to promote **“development that meets the needs of the present without compromising the ability of future generations to meet their own needs”** (WECD 1987). The adoption of the underlying ethics for sustainability assumes that suggested principles are incorporated into social institutions, and that society will be able to enact norms that will modify behaviors (Thompson 2010).

²⁹ Wellbeing or social welfare is understood as a desired condition of quality of life yet to be determined by communities, as its determination requires details of the tractable elements that affect social welfare. Social welfare may have different meanings at different places; ideally these understandings should have some commonalities that allow knitting together local understandings with regional and worldwide visions of social welfare.

Another feature of sustainability attributed to CSEs is the ability of these groups to recognize the need to adapt to changes in the surrounding environment. Richard Norgaard (1984) argued that the current condition of the environment and availability of natural resources has induced changes in culture and technological advancements, a process of change labeled “co-evolution”. This coevolution is already observed at a worldwide scale, in which concerns about environmental conditions triggered responses in the form of governmental actions or international dialogue (e.g. United Nations Conference on Sustainable Development 1992). At the level of communities, the coevolution principle suggests community members understand their role as part of a system that is comprised of closely interacting and interdependent sub-systems, which is a deep understanding of their social and ecological system. The systemic approach shall allow for a comprehensive appreciation of the multiple sources of human and environmental problems. Appreciation of the interdependence of human and ecological systems allows communities to observe complexity and not to think about their problems in a deterministic way by dividing and solving for parts (Norton 2005); (Thompson 2007). Norgaard (1994) argues that problems reduced to their minimal parts cannot be called problems anymore because they have lost their systemic properties. In a systemic approach, multiple views and alternative views of reality are identified through a participatory process. This diversity also allows for the recognition of alternative ways of learning because local people often have clear ideas from their own perspective and in their own terms without the expert’s influence (Bell and Morse 2008). Addressing problems in a pluralistic setting suggests a transdisciplinary³⁰ approach

³⁰ Transdisciplinarity tackles complexity in science and challenges knowledge fragmentation. This type of research accepts contexts and uncertainty; it is a context specific negotiation of knowledge; and it implies intercommunicative action. As a research process, it includes the practical reasoning of individuals with the

for identifying and deciding upon needed actions (Lawrence 2010). Bringing together decision makers in a transdisciplinary context also creates an arena for expression of different values in the planning process.

Because of the process through which community indicators are created, they presumably can incorporate many dimensions and principles of sustainability. However, whether community indicators are consistent with theoretical conceptualizations of sustainability is unclear. In addition, CSIs may offer insights into values that are associated with community-level understanding of sustainability. Whether implementation of global sustainability can be informed by a closer look at how sustainability is understood at the community level is also unclear.

C. Assessment of Development and Sustainability with Indicators

1. The Gross Domestic Product as National Scale Indicator

Indicators have historically played an important role in tracking progress and in informing, supporting and improving policy and decision-making at different levels (Gallopín 2005). The national gross domestic product (GDP), an indicator of the performance of the economic system (Nordhaus, Kokkelenberg et al. 1999) is measured as the sum of expenditures by consumers, businesses, government and foreigners on final goods and services or as the sum of payments to the factors of production (Weimer and Vining 2004). Although influential, the GDP was not designed to be an indicator of a nation's wellbeing. Yet, in many cases it has been used in this

constraining and complex nature of social, organizational and material context. It also seeks to close the gap between knowledge derived from research and decision-making processes in society. Transdisciplinary research is often action oriented (Lawrence 2010)

way (Hecht 2005). For multiple reasons, the GDP is an inadequate indicator of general wellbeing. By design this indicator only adds the transactions in an economy without accounting for all the benefits and costs related to wellbeing. Anielski and Rowe (1999) described some of the most important shortcomings of GDP as indicator of welfare. :

- GDP does not account for inequality of income, wealth and spending power.
- GDP treats crime, imprisonment, divorce and other forms of family and social breakdown as economic gain, yet the values of housework, parenting and volunteering count for nothing.
- GDP does not account for the depletion or degradation of natural resources and the environment.
- GDP increases by expenditures caused by climatic disasters, war, and polluting activities both during the pollution activity and the abatement phase.
- GDP does not account for the liabilities of living on debt and foreign borrowing.

GDP also fails to reflect that one kind of asset is being traded or exchanged for another expected to generate a higher return (Repetto and World Resources Institute. 1989). Repetto's example is the farmer who cuts timber to build a barn. The barn is worth more for him than the trees. The national system of accounts (the base for the calculation of the GDP) will credit the timber and the construction of the barn (income and investment) but the loss of ecological benefits from the cut down forest is not reflected. In addition, if the farmer had used the money from the timber for a vacation, he would be poorer on his return and not able to build the barn, but national income would register a gain, neither a loss in wealth nor a loss of forest benefits. Taken to a country level, the results can be illusory gains in income and permanent losses in wellbeing. These

balance sheet asymmetries are particularly dangerous for economies depending heavily on their natural resource base for employment and exports.

2. The emergence of indicators capturing broader measures of wellbeing

Criticisms of using direct measures of material welfare such as GDP (Hecht 2005) as indicators of wellbeing motivated the creation of alternative measures of progress that better captured broader understandings of wellbeing. International forums such as the 1992 United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro, Brazil, addressed the need for alternative measures of wellbeing. Agenda 21, one of the concluding documents from this conference, noted the following:

“Commonly used indicators such as the gross national product (GNP) and measurements of individual resource or pollution flows do not provide adequate indications of sustainability. Methods for assessing interactions between different sectorial environmental, demographic, social and developmental parameters are not sufficiently developed or applied. Indicators of sustainable development need to be developed to provide solid bases for decision-making at all levels and to contribute to a self-regulating sustainability of integrated environment and development systems.” (United Nations Commission on Sustainable Development 1992 paragraph 40.4)

One example of an influential indicator that was constructed to broaden the measures of wellbeing is the Genuine Progress Indicator (GPI). GPI has its foundations in the Index of Sustainable Economic Welfare (ISEW) proposed by Daly and Cobb (1994), initially known as the Green GDP. ISEW underwent significant improvements in terms of data sources and

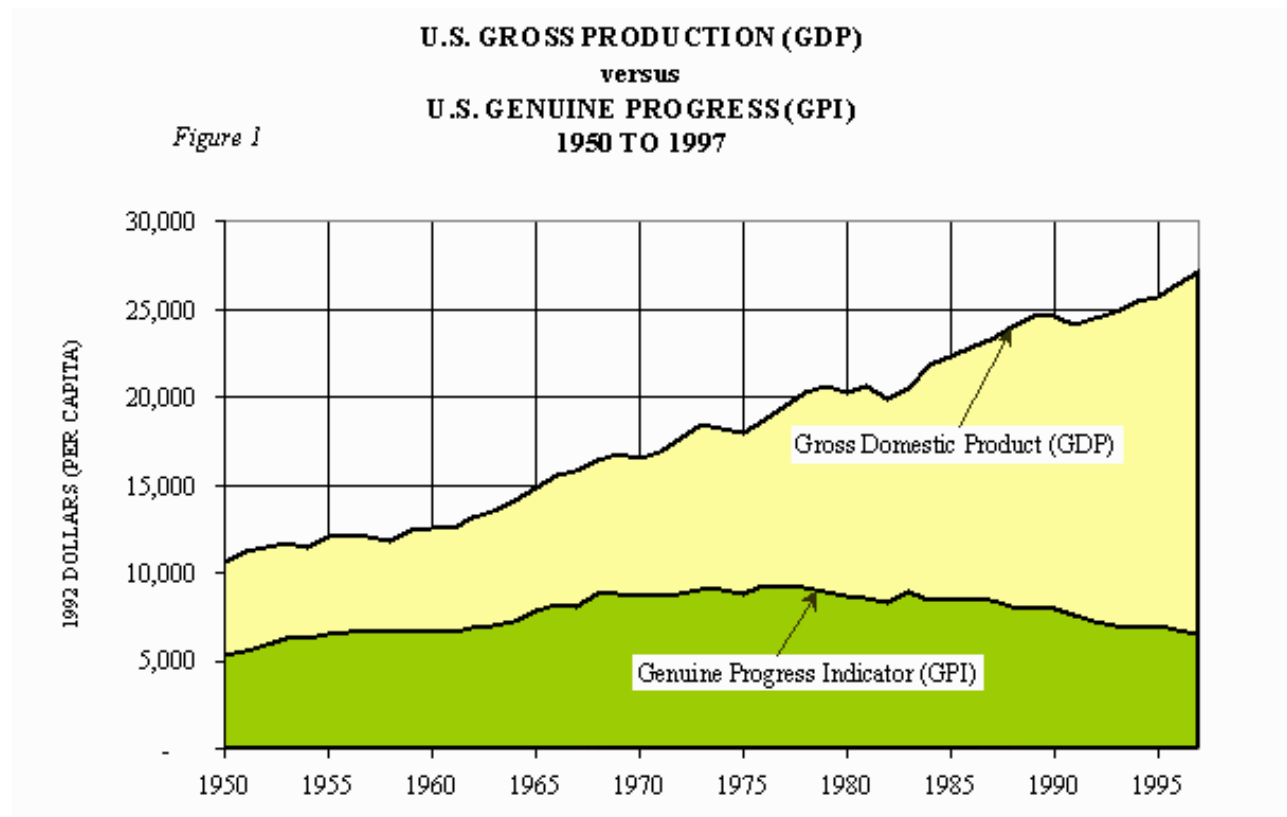
calculations, which resulted in the GPI. For estimation of the GPI, 26 components based on economic, social and environmental criteria are included to create an indicator that better reflects how material welfare and social welfare are related. Clearly the dimensions recommended follow those discussed under different understandings of sustainability.

Most criticisms of GPI revolve around the choice of the components, data availability to construct the components, and methods of calculation (Talberth, Cobb et al. 2007). A very important critique is that GPI falls short in reflecting intergenerational equity in the distribution of natural capital, given that standard discounting methods result in very low or even excluded present values of costs to future generations for depletion of natural capital. Additionally by design, GPI measures a type of sustainability that allows for perfect substitution between natural and human-built capital (Talberth, Cobb et al. 2007). For critics, such substitution is a matter of concern because it validates actions to deplete resources that provide services for which humanity still does not know any substitutes (e.g. climate regulation done by forests).

Regardless of criticism, GPI still provides a better understanding of natural and human capital exhaustion than GDP. Anielski and Rowe (1999) calculated the U.S. GPI for the 50-year period ending in 1999 and compared it to GDP. Their results show what they called an accelerated erosion of natural, human and social capital, as measured by GPI, whereas GDP indicates almost continual economic improvement for the period. As shown in figure 7, while U.S. GDP per capita (adjusted for inflation) showed growth from 1950 to 1999, the U.S. GPI per capita began to decrease during the mid-1970s. In fact, the 1990s saw the largest reduction of the real GPI, which declined at an average annual rate of 2.7 percent, compared with per capita GDP growth

of 1.4 percent (Anielski and Rowe 1999). The inflection point differentiating the trends between GPI and GDP was previously identified using the ISEW method and resulted in the “threshold hypothesis” (Max-Neef 1995). The threshold hypothesis supports the theory of limits to grow and nature’s carrying capacity and emphasizes the error of framing human progress in pure economic terms.

Figure 7. Comparison of GDP and GPI measures for US. From Anielski and Rowe (1999)



Although the GPI seems promising for the task of generating broader measures of wellbeing, it is not widely used at the community-level because of problems with data availability and the national scale at which many variables are measured (Bagstad and Ceroni 2008). A compelling message in the literature about indicators is that the national level approach for creating indicators used over the last 50 years has not made a dramatic impact in driving or informing

policy at local levels. Additionally many of those indicators are not used by policymakers regardless of the tremendous investment of time and money put into developing them (Innes and Booher 2000). Others have seen the use of national indicators as a misleading tool for progress (Max-Neef 1995).

Discussions surrounding the emergence of ISEW and GPI were highly influential in the rethinking of metrics for wellbeing. Further development of this thinking has suggested that, for sustainability implementation, a change in discourse and methods for the appreciation of wellbeing is needed. In response to this need for change, community-level Indicators provide an alternative that seeks both to capture the concept of sustainability and to correct some of practical shortcomings of national level indicators.

3. Community Indicators

The Agenda 21 report (United Nations Commission on Sustainable Development 1992) argued that one of the fundamental prerequisites for the transition to SD is broader public participation in decision-making involving individuals, groups and organizations, particularly for those decisions which may affect the communities in which participants live and work (Agenda 21: paragraph 23.2). Given the international community's strong interest in engaging communities in sustainability-oriented policy making and the limitations posed by the use of national level indicators, community indicator projects have taken some prominence in participatory development planning initiatives. This is because sustainability indicators can serve as a vehicle to enhance the overall understanding of environmental and social problems at local levels and facilitate community capacity building, while helping guide policy and community development projects (Reed, Fraser et al. 2006).

In principle, community-indicators are constructed through a deliberative process and provide not only measures of the status quo but also indicate movement toward local visions of sustainability (Smolko and Redefining Progress 2006). **The process of community engagement is perceived to be as important as the product.** It is assumed that the process will have a working group that understands the depth and breadth of the linkages between human and ecological systems (Berkes, Folke et al. 1998) and capture in metrics all welfare elements that are important for the community in a way that can be technically acceptable (Portney 2003).

D. Analytical Framework

To address the research questions, an analytical framework was developed to capture those characteristics of indicators that can be associated with sustainability (as a theoretical concept) and other characteristics related to the functionality of the indicators. The analytical framework (shown as table 4 and explained in the methods section) characterizes the indicators according to the dimension of sustainability to which the indicator refers (ecological and biophysical; economic; social and cultural; and psychological). The framework also separates the indicators according to the type of value system that they may refer to; in this case the typology applied is Thompson (2007) distinction between resource sufficiency and functional integrity. In this case, it was applied by scaling up the categorization to general community measures. The third way in which the framework characterizes the indicators refers to the indicator's function, that is, whether it is descriptive, diagnostic or normative.

Table 4. Analytical Framework used to categorize indicators by value system, dimension of sustainability, and by type of indicator

Type of Indicator	Resource Sufficiency						Functional Integrity					
	Static			Dynamic			Static			Dynamic		
	Descriptive		Diagnostic		Normative		Descriptive		Diagnostic		Normative	
	State	Pressure	Impact	Response		Drivers	State	Pressure	Impact	Response		Drivers
Dimensions of Sustainability												
Ecological and Biophysical												
Economic												
Social and Cultural												
Psychological												

1. Dimensions of Sustainability

For this research the dimensions of sustainability are fundamental to understand how members of the CSEs understand the human-ecological system of their community. With this analytical framework, four dimensions of sustainability that are associated with the application of the concept in development work are identified. Frequently the concept of sustainability is mistakenly associated exclusively with environmental conditions. However, the literature on sustainability suggests that implementation of sustainability should consider at least the social, environmental and economic dimensions (Altieri 1987, UN World Commission on Environment and Development 1987, Carroll 1991, Holdren, Daily et al. 1995, Munasinghe and McNeely 1995, Lawn 2006, O'Connor 2006, Connelly 2007). Lawn (2006) expands these three dimensions by adding a psychological dimension as a way to separate individual needs from

social needs, which may be very different. For this research, the dimensions are described as follows:

a) *Ecological and Biophysical Dimension*

This dimension is the basis for understandings of sustainability suggesting that basic and irreplaceable resources that sustain human life are to be maintained indefinitely in order to satisfy the intergenerational equity criteria (UN World Commission on Environment and Development 1987, Norton 2005). The dimension encompasses all biological components from the biosphere that support and give continuity to ecosystems. This dimension captures those elements that constitute the world's resource base and provide raw materials for human activities. Stewardship of these ecological elements differs from past theories of resource management in that regardless of whether society is trying to preserve integrity of ecosystems or to secure the provision of raw materials, sustainability calls attention to ecological resilience, maintenance of biodiversity, ecological thresholds, carrying capacity of ecosystems, and the systemic interdependence of these factors with human systems.

The interaction of this dimension with the social and economic dimensions represents human relationship to nature; the aiming of highlighting this interaction is to focus attention on the actions that cause negative (intended or unintended) impacts on the environment and to allow for a space to decide over actions aimed at reducing environmental pollution and increasing the quality of environmental conditions. The quality of the environment is related to the other dimensions because it is the source of benefits for society. For this research, this dimension combines anthropocentric and biocentric values, in the sense that some of the actions included under this dimension may be aimed towards the preservation of the environment for either the

benefits provided to humanity or for the intrinsic values of the environment. For instance, the preservation of natural areas is in many cases for the sake of the existence of those species and the ecosystems within it, and not necessarily for any foreseen economic benefits.

b) Economic Dimension

This dimension refers to all actions of the human system oriented towards the generation of material welfare and income (Lawn 2006, Connelly 2007). Economic progress is measured as increases in goods and services consumed. Thus, economic policies typically seek to increase conventional gross national product (GNP) and induce more efficient production and consumption of (mainly marketed) goods and services (Hecht 2005). Mainstream (neoclassical) economics provides the concepts underlying this framework. However, under this dimension are also listed all those actions aimed at fostering change in the dependence on scarce resources and traditional production and consumption habits. It extends to include the nature of the technological changes aimed to maintain economic productivity within the limits of the Earth's carrying capacity. Examples include alternative sources of energy and actions aimed towards the rational use of natural resources. It also includes economic models that allow for the growth of markets that address social concerns in the sense that these markets allow for social justice (fair-trade) and the inclusion of different types of ethics other than simply utilitarian (farm markets, organic markets, healthy food choices).

c) Social and Cultural Dimension

The definition of SD highlights the importance of matters of social equity and justice as core elements for social development (WCED 1987). The reinforcement of the social dimension is emphasized in the first publication of the United Nations Human Development Report (UNDP 1990) stating that development should enhance people's choices and should develop human

capabilities such as knowledge. This dimension includes the social and cultural institutions found in every community. Institutions are understood as:

“[T]he rules of the game in a society, or more formally, are the humanly devised constraints that shape human interaction. In consequence, they structure incentives in human exchange, whether political, social, or economic. Institutional change shapes the way societies evolve through time and hence is the key to understand historical change.”(North 1990 p 3).

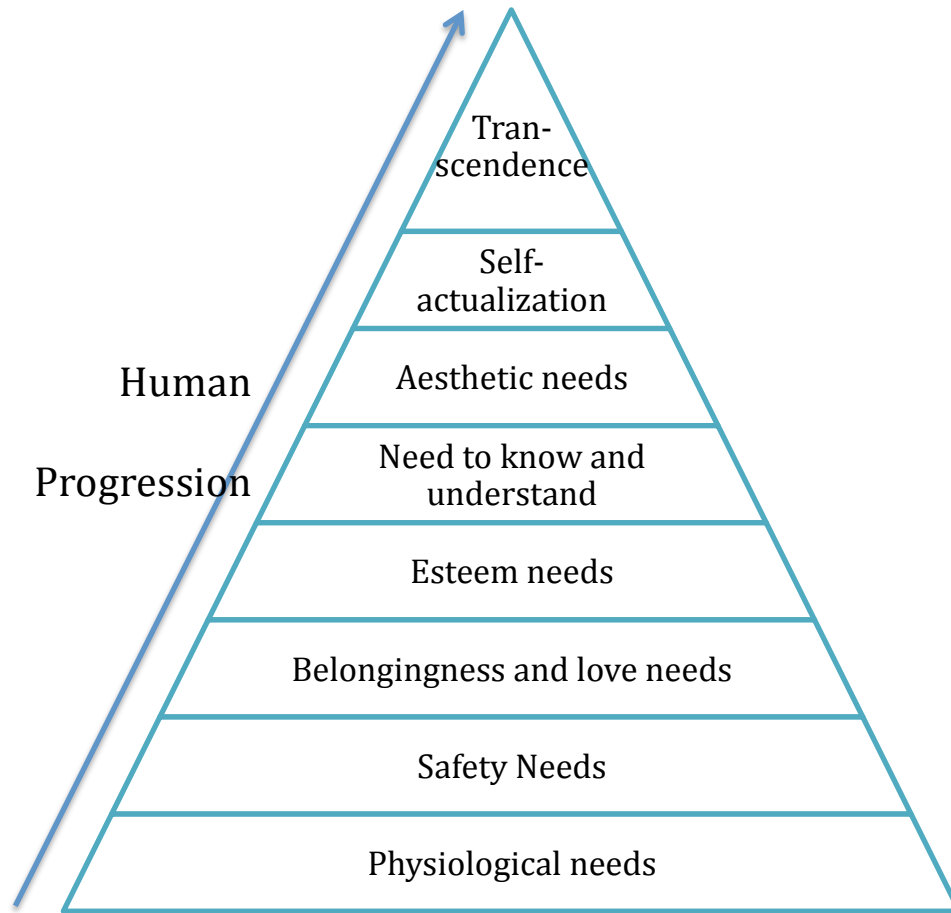
Institutions serve as the means to achieve social development. Fukuyama defines social capital as “an instantiated informal norm that promotes cooperation between two or more individuals” (Fukuyama 2001 p 7). Thus the increase in social development usually refers to increases in social capital or institutions in the interest of improvements in overall social welfare. Social capital can be expanded and understood as the resource that people draw upon to achieve collective objectives through networks and the connectedness provided by social institutions (formal and informal), membership in more formalized groups, and relationships of trust, reciprocity, and exchange. Also, institutions safeguard and serve as the vehicle for communities to express local values. For instance, existing institutions may adopt changes in practices to increase fairness in the provision of services to the community.

This dimension captures all those formal and informal institutions in the form of organizations, groups, NGOs, and any other organization from the civil society that serves a purpose within the community.

d) Psychological Dimension

This dimension is suggested by Lawn (2006) as a way to group all actions that allow for the advancement of the human condition at the individual level. For this research, the psychological dimension captures the benefits that society can provide to individuals in order to build their willingness and preparedness to participate in the organization of the community. The assumption here is that once individuals satisfy their basic needs they may better identify with their respective communities and be willing to work on common goals. Lawn (2006) uses Maslow's hierarchy theory to explain this dimension, although some have questioned the theory of needs (Wahba and Bridwell 1976). Maslow's pyramid (Figure 8) is applied in this discussion as a heuristic to reflect that actions oriented to the satisfaction of individual needs are expected to increase the readiness of the individual to engage in collective action. This dimension can be viewed as the pre-condition for the social and cultural dimension.

Figure 8. Maslow hierarchy of needs



Traditionally, basic order needs such as the provision of food, clothing, shelter and safety, are more obvious needs in community development plans than higher order needs such as self-actualization. Self-actualization needs refer to the individual's desire to fulfill what he or she is capable of becoming. These needs are emerging higher order psychological needs that contribute to human development in what is expected to become a more *balanced* society. Lawn's arguments for these factors suggests that the human condition at the higher order level of needs may allow for individuals to develop awareness and predisposition for a break from path

dependence, in other words for the modification in habits and customs that are not congruent with current desired social values. This predisposition becomes key when modified principles for human behavior, coming from sustainability discussions, are calling for the adoption of practices to reverse conditions such as social inequities (gender, racial, income), environmental injustices and the misleading notion of constant economic growth.

Another rationale for this dimension comes from the post-materialist values perspective, which suggests that concern for quality of life issues occurs only after individuals have met their more basic needs for food, shelter, and safety. The post-materialist perspective focuses on broader social values like freedom, self-expression and quality of life. Some proponents suggest that the shift to post-materialistic values also gave way to the emergence of environmental values (Oskamp 2004).

Actions oriented to the satisfaction of individual needs are expected to increase the readiness of the individual to engage in collective action. This dimension can be viewed as the pre-condition for the social and cultural dimension.

2. **Resource Sufficiency and Functional Integrity as Sustainability Value Systems**

Two broad approaches encompass how people define and use the concept of sustainability in problem solving and policy contexts: resource sufficiency and functional integrity³¹ (Thompson 2007). **Resource sufficiency** involves the quantification and availability of resources in reference to a rate of consumption by human practices and how long the practice can be continued given the availability of resources. **Functional integrity** refers to the system's resilience after being threatened by human practices. Therefore in the practice of constructing sustainability indicators, communities may demonstrate one of these two perspectives, and sustainability alternatively will mean:

- Planned actions to secure the provision of resources to support a thriving human existence; or
- Strategies to secure the capacity and resilience of social and ecological systems.

a) Resource Sufficiency

When understood as resource sufficiency (RS), sustainability refers to the maintenance of resources given a timeframe during which consumption occurs. Thompson (2007) argues two caveats are important to this conception. First, the availability of resources over some period of

³¹ Aside from these two approaches, Thompson (2007) identifies the non-substantive use of the word sustainability, in which sustainability is a “useful conceptualization in structuring popular discussion and debate while linking environmental impacts with social justice” (p. 9). Non-substantive use of sustainability involves moral labeling of human practices. However, as Thompson stresses, deeming practices bad or unjust is virtually meaningless unless there are specific criteria with which to determine what bad or unjust means.

time frame must be established. Second, implicit is the notion that human actions will find limitations and growth will be hampered by resource scarcity; therefore, the resource sufficiency approach prescribes that a decreased rate of consumption or the substitution of man-made resources for natural resources is necessary to enable continued consumption. Substitution, as Thompson (2007) and others (citations) have argued, is a highly contested option, but it is a key part of RS.

Critical pre-conditions for RS include that the moral obligation to future generations is accepted and constitutes part of current social decisions. Also, a full accounting of resources is necessary, a rather difficult task but necessary to determine the capacity of resources to sustain consumption. Consequently, and as the basis for substitution, society is expected to actively pursue technological improvement to provide substitutes for scarce or depleted resources. A critical underlying assumption is that society has full understanding of ecosystem dynamics and the interrelatedness of those dynamics with the maintenance of human well-being. This understanding is critical to support decisions about the extent to which consumption and substitution can be exercised.

b) Functional Integrity

Functional integrity (FI), “presupposes a system having crucial elements that are reproduced over time in a manner or at a rate that depends upon previous system states” (Thompson 2007). This includes both ecological and social systems. In this sense, not only is the ecosystem’s integrity critical but also the integrity of social institutions (formal and informal) upon which a functional society rests. That the system has functional integrity means that the system

establishes a range for the reproduction of crucial elements allowing them neither to increase without limit nor to disappear from the system altogether (Thompson 1995).

FI also presupposes a balanced state of the ecological-human system, a dynamic ever-changing condition, in which the functionality of the system's processes allows for the enjoyment of the benefits provided by the system. The system itself can range from a local productive activity such as livestock farming to biodiversity at the global scale. For this research, preconditions for FI are also understood. For instance decision-makers should have knowledge of the interrelatedness of the elements within the human-ecological system, while having the objective ability to define the system's boundaries. Also, decision-makers embrace biocentric values because in some cases the system's boundaries will not be limited by political or regional jurisdictions but rather by some larger scale considerations.

Goals of RS and FI can exist in combination. In the implementation of sustainability, and in the context of planning for community development, expression of one value or the other may depend on the institutional or technical solutions at hand or the intentions leading the practice of community development. However, it may be difficult to separate RS and FI intentions in a comprehensive community development plan. One way to distinguish the dominant perspective may reside in understanding the different practices included in the development plan. For this research, choices of indicators are viewed as proxies for those practices. Therefore, by evaluating the objectives of indicators and the associated policies, it is possible to distinguish actions oriented towards either RS or FI.

3. **Types of Indicators**

Indicators help community planners to bring into operation their vision of sustainability. This is possible because indicators transform abstract notions of community well-being into specific measures of intended outcomes or trends. These outcome measures serve as the base on which specific strategies can be constructed; in combination, all indicators and intended outcomes serve as the guide for strategies to achieve a desired state of well-being.

Indicators can serve to explain what is happening right now, what is going to happen or what communities would like to happen. Thus, indicators can be categorized as descriptive, diagnostic, and normative. Descriptive indicators are usually a more static type of measure; they provide a snapshot of the community. Diagnostic and normative indicators are related to actions intended to promote a desired change in conditions; therefore they are considered dynamic observations.

a) Descriptive Indicators

Generally Indicators that are descriptive do not show a trend (a comparative measure taken for a number of years). If they do show a trend it is usually not in response to an intended action/policy. Rather, these indicators basically function to show the condition of a resource or service within the community, a snapshot of the state of that resource/service. They can be categorized as having either one of the following functions:

(1) Descriptive-State,

This type indicates the condition or state of a resource or service without showing a trend or without being related to consumption pressures. For instance, indicators about land area or water

sources can be descriptive-state if the land or water is not subject to current consumption pressures. The indicator is simply providing information of availability.

(2) Descriptive-Pressure.

This type of indicator shows the condition of a resource/service under pressure from the use or overuse of the services/benefits it provides to the community. It can be that a resource is under stress caused by some human action or the result of excessive demand. Examples include indicators for groundwater sources subject to heavy consumption or the number of shelters for homeless in areas where a large number of people demand this service.

b) Diagnostic Indicators

Diagnostic indicators are built on models that specify causal relationships, and they can provide accurate predictions about the consequences of policies (Phillips 2005). For instance the indicator of reading proficiency at the third grade is a diagnostic indicator in the sense that it serves to predict the degree of success of a student in successfully completing high school. Also, as a diagnostic indicator, it is linked to an action or policy for change and to other descriptive indicators in a framework that helps community decision-makers observe the interrelatedness among indicators.

(1) Diagnostic-Impact

In this case, the indicator signals the effect of a policy / action on an actual trend or behavior. For instance, the percentage of obese people in the community can be a diagnostic indicator of current undesirable trends in low access to healthy food, low educational levels, and inequity in distribution of income.

(2) Diagnostic-Response

This type of indicator signals the effect of a policy that creates a new action, behavior or trend. Again, overweight people can be a diagnostic-response indicator if it is linked to actions intended to reduce obesity, such as initiatives that increase recreational areas, walkability in communities, and access to healthier foods.

c) Normative Indicators

Indicators of this type include measures related to alternative initiatives to produce meaningful change of the status quo. This category captures actions that foster radical changes within the community. For instance, if the community has been predominantly dependent on fossil fuels for a long time (and there are high costs related to the production of energy and concerns about pollution) an example of a normative indicator would be the measure of energy produced by alternative sources. Of course, for the indicator to be considered as normative, it means that the community wishes to observe a reduction in the use of fossil fuels and associated pollution.

E. Methods

1. Data Sources

Data for community sustainability indicators were gathered using a non-probabilistic, purposeful chain sample method (Patton 2002) from listings of sustainable communities' networks, listings published in literature (Portney 2003, Smolko and Redefining Progress 2006) and white papers published online. Each community studied was selected by applying a sample framework that considered the following:

- Community efforts are any efforts organized around a neighborhood, a town, a city or a region (e.g., watershed, coastal area)

- Community efforts should explicitly work toward indicators of quality of life, and must explicitly have sustainability as part of their stated goals
- Community efforts reporting indicators

In preliminary screenings many CSEs were found at different levels of progress. Stages of progress observed include:

- Stage 1. Local initiatives and interests expressed and shared publicly. At this level, it was found that the effort was promoted by either a grassroots organization fostering alternative means for governmental decisions, or a government initiative inviting local organizations to share the burden of decisions made under the umbrella of sustainability objectives.
- Stage 2. Completion of assessment and compilation of local interests and identification of some initial data/indicators. Some CSEs at this stage report intentions of moving the effort forward in order to gather indicators for already defined visions of sustainability.
- Stage 3. A defined list of indicators in major areas of interest (e.g. health, economy, etc.) and/or a combination of indicators and a small number of initiatives (community objectives) without indicators.
- Stage 4. A regular reporting process exists for a larger list of indicators and more developed categories that address local information needs for policy decision-making.

Only those initiatives that were at or beyond stage three were selected for this research. In the end, 20 CSEs were selected. The communities selected and the reports used for this analysis are listed in table 5.

Table 5. List of cities, year and title of the sustainability indicator reports included in this analysis

	City	Year	Document
1	Atlanta, Georgia	2009	2008-2009 Sustainability Report for Atlanta: Sustainable Atlanta
2	Baltimore, Maryland	2010	Baltimore Sustainability Plan
3	Boston, Massachusetts	2009	Summary of Boston Indicators Report
4	Boulder, Colorado	2009	Boulder County Trends: The community Foundation's Report on Key Indicators
5	Central Texas, Texas (Austin)	2009	2009 Data Report: Central Texas Sustainability Indicators Project
6	Chattanooga, Tennessee	2009	Climate Action Plan
7	Cincinnati, Ohio	2005	Sustainable Cincinnati: Regional Indicators, Measuring the Economic, Environmental and Social Health of the Tri-state Metropolitan Area
8	Durham, North Carolina	2011	Community Indicators Progress Report
9	Grand Rapids, Michigan	2008	Community Triple Bottom Line Indicator Report
10	Jacksonville, Florida	2010	Quality of life progress report for Jacksonville and Northeast Florida
11	Lansing, Michigan	2007	The Power of We
12	Olympia, Washington	2006	An Indicator Research Paper for the Sustainable Community Roundtable
13	Oregon	2009	Achieving the Oregon Shines Vision: Highlights, 2009 Benchmark Report to the People of Oregon
14	Philadelphia, Pennsylvania	2010	Progress Report Green Works Philadelphia
15	Pittsburgh, Pennsylvania	2004	Sustainable Pittsburgh: Southwestern Pennsylvania Regional Indicator Report 2004
16	Santa Monica, California	2006	Sustainable City Plan: City of Santa Monica
17	Seattle, Washington	2006	Indicators of Sustainable Community
18	Tucson, Arizona	2000	The Livable Tucson vision program
19	Washington, District Central	2010	Washington DC Neighborhood Sustainability Indicators Project: Pilot Project Overview Report
20	Minneapolis, Minnesota	2011	Minneapolis Living Well: Sustainability Report

2. Data Analysis

The secondary data gathered was processed as qualitative data using the method of framework analysis (Ritchie and Spencer 1994) to sift, chart and sort indicators according to dimensions of sustainability, the value system for sustainability, and their type. Application of five recommended steps for framework analysis (Ritchie and Spencer 1994) for this research was conducted as follows:

Familiarization: During this stage, all possible reports containing sustainability indicators were examined, and a subset was selected using the sample framework previously discussed. Reviewing reports also involved reviewing databases listing cities with sustainability reports to understand their purpose and working procedures.

Identifying the thematic framework: This stage involved the conceptualization of key salient themes, particularly because of specific questions related to how to organize indicators according to dimensions of sustainability and value systems. The theme of ‘types of indicators’ was chosen to be part of the framework after observing the different uses of indicators by communities. Each one of these themes was defined based on theory.

Indexing: Each indicator report was individually studied to identify indicators, and each indicator was systematically evaluated against the themes. For this, it was important to understand the meaning and objective of each indicator. This additional information was also recorded. Emergent new themes were added in this process, for instance the dimension of engagement as a sustainability dimension.

Charting: Once each of the 1229 indicators was indexed, they were organized according to the framework (table 4) built for this purpose using the key themes.

Mapping and interpretation: In this phase, patterns of indicators across frame themes were identified. Although the analysis is qualitative, measures of aggregation (counting of indicators per cell) were helpful in facilitating the process.

The following section provides a more detailed explanation of the judgments made as to the meaning and significance of each indicator for its respective indexing and charting.

a) Organization of the Dimensions of Sustainability

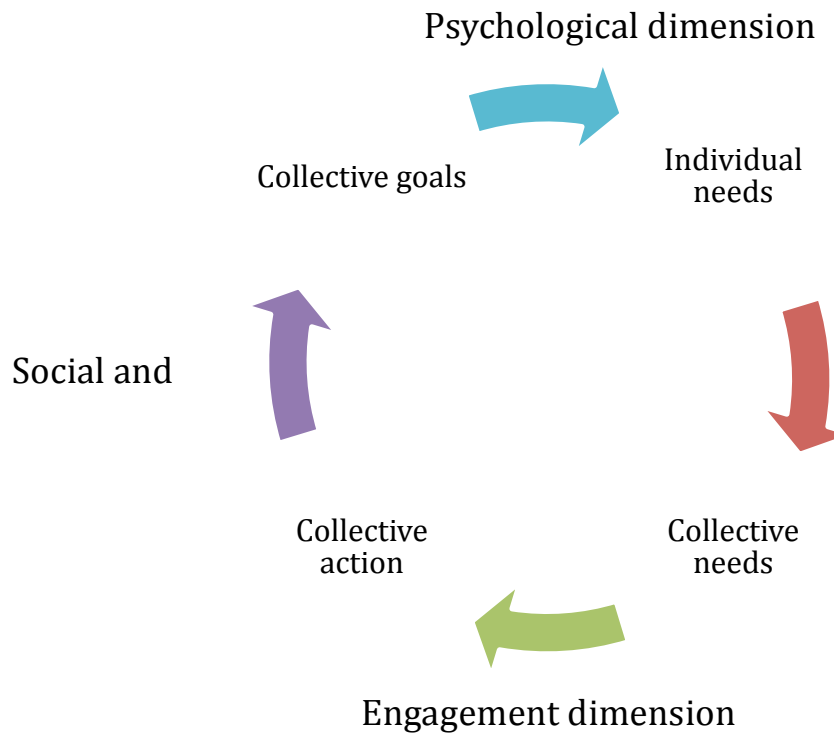
Organization of indicators according to dimensions of sustainability was conducted based on whether the communities have followed suggested theoretical dimensions. During the initial review of materials it was found that most communities strictly followed the three most common dimensions of environment, economy and society. None of the communities used the psychological dimension specifically. However a group of indicators that did not fall into any of the traditional categories were found to better fit the definition of the psychological dimension in 17 of the cases. These indicators were categorized as such in order to clearly differentiate them from the social and cultural dimension. The basic criteria to differentiate psychological indicators from social and cultural indicators were that indicators were aimed towards providing benefits to the individual citizen (as opposed to the community at large) and that they pertained to the provision of basic human needs.

After reviewing the indicators from the 20 communities, a fifth dimension was identified. Two communities established a new dimension encompassing all indicators related to civic engagement, civic participation and giving (as in monetary donations to community projects). This dimension was labeled **engagement** for the purpose of this research, and it was applied to

all other communities. This new dimension is different from Social and Cultural dimension in the sense that under the engagement dimension, indicators reflect all efforts aimed to provided the resources and material conditions to foster human interactions. For social capital to grow, it is not only people's capacity that matters (as seen within social-cultural dimension), it is also necessary to provide the physical conditions (places for meetings, arrange the meetings, foster local organizations) and the resources necessary for this to occur (in the form of donations and participation of citizens in these actions).

Figure 9 shows the sequence in which this research identifies the relationship between the social/cultural, engagement and psychological dimensions. The psychological dimension captures all indicators related to actions aimed towards the advancement of human condition at the individual level; the engagement dimension then provides the resources for collective action to happen; and the social/cultural dimension captures all collective actions carried out via social institutions. This cycle shows a suggested interdependence among needs and actions. The cycle draws from the previous discussion about the role of psychological factors making individuals more prone to participate in collective actions within their communities. Once individuals, needs are satisfied, it may be expected that individuals will express transcendence values and be interested in quality of life matters.

Figure 9. Rationale for the separation of the social/cultural, engagement and psychological dimensions



b) Identifying Sustainability Value Systems: Resource Sufficiency and Functional Integrity

Examples facilitate an explanation of how indicators were categorized under the two perspectives of RS and FI. In general, all indicators related to the provision of raw materials and those related to securing public services (e.g. water, electricity) were categorized under RS. However, and depending on the level of management implicit in the initiatives associated with the indicator, some resource indicators could be categorized as FI. For instance demographic

indicators when used to plan the provision of services were categorized as RS, but when indicators were used to signal changes in strategies for community structure (zoning, walkability, accessibility to markets, etc.), these indicators were categorized as FI. The contrast resides in the objective of the indicator, whether it is used as a tool for the provision of goods and services or as a signal for the perpetuity of a component within the system.

In another example, if indicators about education are linked to strategies to enhance culture, they will fall within the tradition of functional integrity. However, if the same indicators are linked to strategies to secure higher paying jobs for the population, and if the planning group is heavily engaged in managerial actions, these indicators will fall on the side of resource sufficiency because it is related to the capacity of society to generate welfare.

In cases when the indicators suggested dual purposes, the goal receiving higher priority determines the category for the indicator. Priority can be given by the primary goal, or the context in which the indicator is used. If education is used in a framework involving other indicators related to productivity, then it is easier to establish the distinction. In all cases there was always a contextual element or goal that would help define the categorization of the indicator within the tradition of sustainability.

c) Categorizing the Types of Indicators

One objective of this analysis was to capture how static or dynamic communities are in pursuing changes of the elements captured by their indicators; this is reflected in the type of indicators they report and how often they report them. This means that if a community has too many

descriptive indicators, it is more likely to have a very static approach to the interpretation of indicators because descriptive indicators provide only a snapshot of the elements they measure and are not linked to actions to provoke changes in those elements. Alternatively a community with a large number of diagnostic indicators is more likely to have a dynamic approach because diagnostic indicators are linked to initiatives and monitoring changes in the elements they measure. If the community is expecting to observe changes, then its indicators need to be updated frequently. The frequency with which indicator reports are updated varies across the cases.

The categorization of indicators according to whether they are diagnostic or descriptive was done following the previously described definitions; however, it was also very important to understand the way in which communities interpret the information provided by the indicators. For instance, a set of indicators providing information to support a single indicator can be understood as descriptive indicators; the supported indicator becomes diagnostic. Therefore, the same indicator (e.g., crime per 100 thousand inhabitants) could be used in one city as either descriptive or diagnostic, depending on interpretation.

The interpretation of the indicators depends largely on the framework used by the community. The most common procedure is to have groups of indicators organized to respond to a specific initiative; groups of initiatives will respond to a goal. To illustrate, consider the example of landfill waste reduction. The group of descriptive indicators includes: tons of waste entering the landfill, annual cost of landfill operations, city's coverage for waste collection, types of waste collected, and types of recycled materials. The diagnostic indicator in this case is pounds of waste per household per month. The objective is the reduction of waste in general to prevent

pollution (e.g., plastic bottles going into waterways). The initiatives associated with it are increased efficiency in the use of materials (less waste, more efficiency in the use of resources) and the reduction of landfill operating costs to alleviate financial pressures.

One additional variable that comes into play in the definition of how static or dynamic communities are is the number of times they have updated their reports. The number of editions for the report was used for this, and this information was gathered from the reports themselves. In most cases the information was easily available, except for a couple of cases (e.g., Central Texas) in which individual communities initiatives have merged making it hard to detect if there were reports done prior to the merging. Those updated most frequently are indicators available on a web database (e.g., Boston, Oregon and Sustainable Seattle [b-sustainable]).

F. Results and Discussion

1. General findings

From the 20 communities included in this work a total of 1229 indicators were collected. The number of indicators per community ranges from 9 to 190 indicators. Six communities reported fewer than 30 indicators, seven between 31 and 60 indicators, three between 61 and 100, and four communities had more than 100 indicators (highlighted in Table 3 in bold print). The relation between the age of the efforts and the number of indicators reported is evident by the data presented in Table 6. The CSEs with more than 10 years of reporting indicators are Jacksonville/Northeast Florida, Sustainable Seattle, Boston, Central Texas, Boulder and Minneapolis. With the exception of Boulder and Minneapolis, communities with more than 10 years reporting have more indicators than those that have less than 10 years of reporting.

Table 6. List of communities by region within the US, the number of indicators contained in their sustainability reports, initiation date of sustainability effort, year of the report used for this analysis, and number of previous editions of the report

Region / City	Total # of Indicators	Year work Initiated	Year of Report Used	# Of Editions
North Central				
Cincinnati	14	1999	2005	2
Grand Rapids	38	2005	2008	1
Lansing	43	2000	2007	3
Minneapolis	26	2000	2010	5
Northeast				
Baltimore	32	2008	2010	2
Boston	186	2000	2009	5*
Philadelphia	15	2008	2010	1^
Southwestern PA	28	1998	2004	2
Washington DC (pilot project)	35	2009	2010	1
South Central				
Boulder	59	1995	2009	6
Central Texas	190	1999	2009	7
Tucson	62	1997	2011	2*
Southeast				
Atlanta	9	2007	2009	1
Chattanooga	46	2007	2009	1
Durham	39	2002	2011	4
Jacksonville and Northeast FL	110	1975	2010	26
West				
Olympia	13	1990	2006	1**
Oregon	91	1990	2009	9*
Santa Monica	88	1994	2010	4
Sustainable Seattle	105	1991	2011	5*
Grand Total	1229			

* These communities regularly update and report on in a database on the web

^ Green-works Philadelphia incorporated the work of the 2007 Local Action Plan for Climate Change that was produced by the city's Sustainability Working Group, a task force of more than 50 municipal employees

** No reports earlier than 2006 were found online, nor information about the frequency of updates.

The count of indicators falling within the categorizations of interest defined by the analytical framework are shown in Table 7, in which indicators are separated by dimension of sustainability (including the fifth dimension of engagement), value system they pertain to, and the type of indicator according to use.

Table 7. Count of indicators within the analytical framework

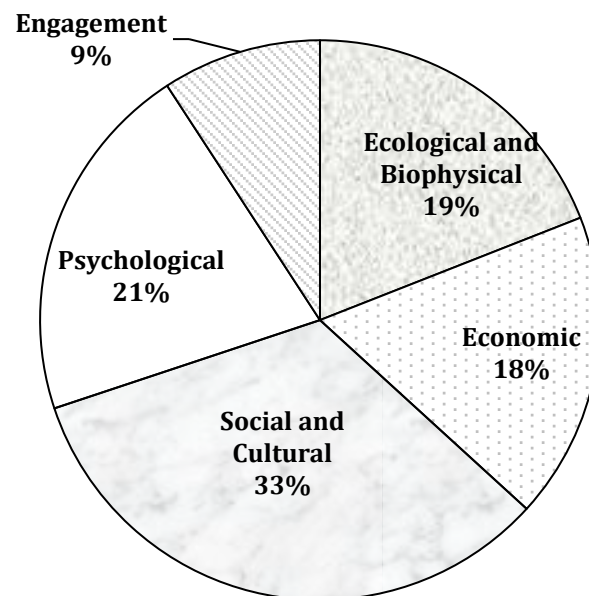
	Resource Sufficiency					Functional Integrity						
	<i>Descriptive</i>		<i>Diagnostic</i>		<i>Norm.</i>	<i>Descriptive</i>		<i>Diagnostic</i>		<i>Norm.</i>		
	<i>State</i>	<i>Pre.</i>	<i>Impact</i>	<i>Res.</i>	<i>Drivers</i>	<i>State</i>	<i>Pres.</i>	<i>Impact</i>	<i>Res.</i>	<i>Drivers</i>	Count Row	
Ecological and Biophysical	24	26	24	3	9	45	36	43	11	13	234	
Economic	46	13	71	6	19	27	0	29	3	4	218	
Social and Cultural	64	31	25	5	5	119	31	107	19	9	415	
Psychological	6	7	10	1	1	78	48	72	20	5	248	
Engagement	1	0	0	0	0	68	6	30	4	5	114	
Subtotal	141	77	130	15	34	337	121	281	57	36		
	218		145		34	458		338		36		
Total Resource Sufficiency					397	Total Functional Integrity					832	1229
					32.30%						67.70%	100.00%

2. Dimensions of Sustainability

In terms of the dimensions of sustainability defined by communities to characterize their indicators, communities are very consistent in following the social, economic and environmental dimensions suggested by the literature (UN World Commission on Environment and

Development 1987, Holdren, Daily et al. 1995). Some followed these dimensions strictly; others had variants in which they renamed the dimensions under similar names such as human environment, built environment, and natural environment to encompass essentially the same meanings. For the purpose of this analysis, the psychological and engagement dimensions were used to separate those indicators meeting the criteria for either one of these dimensions.

Figure 10. Proportional distribution of indicators by Sustainability Dimensions



From all cases, 63.5 percent of indicators are contained within the social/cultural, psychological, and engagement dimensions. This provides evidence of a strong inclination of the communities to create indicators related to human actions, as opposed to a more balanced distribution of the indicators among the economic and environmental dimensions. Economic indicators comprise only 17 percent of the total and biophysical/ecological indicators are 19 percent of the 1229 indicators.

a) *Ecological and biophysical dimension*

When addressing ecological and biophysical factors, communities most commonly use indicators related to air quality and water quality/quantity. It is possible that climate change perceptions are the motivation behind air quality indicators; evidence of this is that all communities in the study have indicators related to air quality and greenhouse gas emissions as part of strategies to improve or maintain air quality.

In terms of water, 18 communities reported indicators of water quality; their indicators are tied to strategies to preserve the resource for future availability for human consumption. For most communities however, indicators of water quality serve multiple objectives. Aside from human consumption, indicators of water quality address the preservation of aquatic ecosystems and biodiversity contained in those areas. This is evidence of how communities express broader understanding of the interrelatedness of healthy ecosystems, biodiversity, water quality, water availability and other related activities (such as recreation). Indicators of toxics released into water bodies reflect additional evidence of this understanding; 18 communities reported this type of indicator tied to initiatives to either remediate pollution or reduce it.

One limitation in the analysis of indicators under this dimension is that, because of the specific case study sites, most indicators refer only to ecological and biophysical factors within the urban setting. The rural setting is brought up in a few cases only. For instance for forest indicators, communities such as Washington DC, Chattanooga, Minneapolis, and Olympia report indicators related to forest coverage within the cities, open spaces and recreational areas such as parks. Only Oregon reported indicators that accounted for forests as timber resources, fresh water

species and marine species. The Oregon effort stretches over several counties and has a larger area under monitoring.

Land, as a resource, is also monitored with several indicators by 14 communities. In most cases the indicators denoted the percentage of types of land uses within their jurisdictions. The most common categorizations are areas under development (as construction of new homes), farmlands, preservation areas, and industrial zones. This categorization was made with the intention of signaling and guiding growth strategies. However, no community addressed land use (in rural areas) from the perspective of food production capacity (e.g. categorization of their land according to production capability). Half of the sample, however, had indicators related to habitat protection, health of water streams or indicators related to areas under some type of preservation.

Waste reduction is another common indicator in this dimension. Such indicators are linked to strategies to make communities more efficient in the use of resources and to reduce pollution that affects ecosystem health and other resources such as fresh water and (in the case of coastal communities) marine fisheries. Because waste reduction is mostly oriented towards pollution prevention strategies and maintenance of healthy ecosystems, indicators of solid waste management were categorized under this dimension rather than under the economic dimension as a strategy to reduce waste collection and disposal costs.

Interestingly none of the communities addressed physical quantities of other resources, aside from fisheries and timber (as in the case of Oregon), which may be critical for productivity. That

is, none took full account of the reserves of available resources for the provision of raw materials. For instance, none of the communities reported indicators related to mining or oil extraction; this circumstance is likely due to the number of urban communities in the sample communities. Alternatively, this finding can be understood as evidence of the limitations communities face in acquiring data, making them choose indicators for which data is more readily available.

b) Economic dimension

That only 18% of indicators address the economic dimension may be evidence that communities give less attention to traditional standard economic indicators that are already influential in the national context. For instance, only Sustainable Seattle (B-Sustainable) uses the GDP as economic indicator. All the other communities have indicators of median income, poverty levels, and unemployment that can also be seen as traditional economic indicators. However, what is unique is that communities frame these indicators in the context of race and disadvantaged neighborhoods to describe the condition of the local economy in the light of inequities and shortfalls of the economy in providing high standards of quality of life to all. Generally the objective of the indicators is framed under initiatives for poverty alleviation. Other commonly found indicators are number of new jobs created, the quality of the jobs in terms of salary, the number of green businesses, and educational attainment as the vehicle to create a competitive workforce for the future.

Indicators for technology as a measure of any type of innovation, levels of competitiveness and as a solution to environmental pollution, are absent in most communities. Only Boston, Massachusetts reports 28 indicators related to universal access to technology and technological

innovation in the form of number of new patents per year and the number of graduates with science and technology degrees. The Cincinnati, Ohio and the B-Sustainable Seattle initiatives address technology with indicators related the extent of workforce employment in technology jobs as a way to measure their ability to be competitive as “the economy shifts towards technology, research and development, the internet and related fields” (Seattle B-Sustainable indicators report). In some cases, without necessarily being deemed strictly as innovation in technology, a link to technological change is observed in indicators related to use of alternative sources of energy. Seven communities listed indicators related to renewable energy consumption. Sometimes, this indicator can either be ecological or economic, depending on its primary goal, which can be the health of the environment/people (by reducing the burning of fossil fuels) or the reduction of energy costs (by reducing expenditures on fossil fuels).

c) Social and cultural dimension

Thirty-three percent of all indicators are categorized this dimension. The most difference between traditional national indicators and local indicators is observed within this dimension. Communities express a rich diversity in the choice of elements to monitor with indicators and innovation in the construction of indicators. Some common indicators found under this dimension may be similar to those found at the national level, for instance, access to health, education, racial disparities, and diversity in government representativeness (gender and racial). But for the most part, indicators are innovative because communities generate their own data through citizen surveys or work with consultants to construct new indicators. Some examples of these new indicators include:

- **Healthy People Index (Cincinnati):** This indicator is a compilation of more than 40 health indicators that capture multiple and diverse aspects of health and wellness, including, for

example, overweight and obesity, suicide rate, infant mortality rate, adults who smoke, percentage of uninsured, and health service availability (percent satisfied).

- **Social Capital Index (Southwestern Pennsylvania):** This indicator is created from a combination of 14 different measures having to do with volunteerism, non-profit and organizational activity, and survey responses to questions like “Do you think most people can be trusted?” and other variables that comprise the region’s “social capital”.
- **Creativity Vitality Index 2008 (Durham, North Carolina):** This indicator shows the community’s creative edge by measuring the annual changes in economic health of an area by integrating economic data streams from both the for-profit and nonprofit sectors of highly creative occupations.

Examples of recurrent social-cultural indicators across communities are:

- For education, reading and mathematics proficiency at the third grade (used as a predictor of successful completion of high school); high school graduation (or drop-out rates).
- For racial disparities, the diversity of elected officials and the measure of racial disparities in home-ownership or business ownership.
- For health, infant mortality, prenatal care, percentage of people with access to health care, percentage of people with health insurance, and percentage of overweight population.

Ten communities have indicators related to food security. Some frame it as part of strategies to strengthen local food systems and the local economy (e.g. Chattanooga). Others link it to strategies to promote health. For instance B-Sustainable Seattle reports an indicator for access to fresh foods. Among the multiple objectives that these indicators have, the most salient is the use

of these indicators as guidance for strategies to abate hunger and make sure that citizens have sufficient access to food and enough income to buy food. For instance, the city of Grand Rapids frames the indicator as part of an initiative to guarantee basic needs (emergency food, rent, shelter). Santa Monica (CA) addresses food security more comprehensively than the rest, trying to capture aspects of healthy food, strengthening the local economy, and support for local farmers. Examples of the indicators reported by Santa Monica include:

- Fresh, Local, Organic Produce: Percent of fresh, locally-produced, organic produce that is served at city facilities and other Santa Monica institutions (including hospitals, schools, Santa Monica College, and City-sponsored food programs)
- Organic Produce – Farmers Markets: Total annual organic produce sales at Santa Monica farmers’ markets
- Percent of Santa Monica restaurants that purchase ingredients at Santa Monica farmers’ markets
- Percent of Santa Monica residents who report that vegetable-based protein is the primary protein source for at least half of their meals

Racial disparities are of particular interest to communities; all communities have indicators that show a picture of racial disparities in terms of income, health access, infant mortality, education attainment, crime rates and safety. Racial diversity and equity is such an important element that in some cases there is a separate report with indicators created around that topic (e.g. Jacksonville and Northeast Florida, and Boston).

d) *Psychological dimension*

This is the most complicated dimension for categorizing indicators. The complication resides in the fact that actions to benefit individuals are sometimes strongly linked to or embedded into actions to achieve collective goals. This makes separating the psychological and social dimensions very difficult. However, 17 communities have clearly differentiable indicators for initiatives to help individuals to satisfy their basic needs within the community. For instance, the need of feeling safe within the community is expressed by these indicators from the City of Boston:

- Impact of terrorism on local public safety resources, Metro Boston
- Collaboration for preventive strategies and emergency preparedness, Metro Boston
- Trends in local public safety in Boston vs. Northeast, US other large cities

Despite the difficulty in differentiating the psychological dimension, 21 percent of indicators are categorized as such. Common indicators across communities are the measures of perceptions of residential safety and trust in neighbors. Also indicators of the percentage of people taking additional training, and number of opportunities for training (different than formal academic education) are included in this category.

In a few cases psychological indicators, such as number of training programs for employees, were linked with broader initiatives and indicators for the capacity of the workforce. In these cases, the separation of two different dimensions would not make sense because they are tightly knitted within the same goal or interpretation framework.

e) *Engagement dimension*

This dimension was incorporated into the evaluation process after finding two communities that made the differentiation of indicators to show the degree in which their community is engaged in providing resources for civic participation. Along with indicators of the resources provided, these communities also created indicators with survey data to capture local perceptions and values related to sense of community. After categorizing engagement indicators for all possible cases, 15 communities were found to have these types of indicators. The dimension captures nine percent of all indicators, with Central Texas, Jacksonville and Northeast Florida, and Boston with the largest number of engagement indicators.

Most common indicators observed under this dimension are self-reported volunteering hours, membership to neighborhood associations, number of civic associations within the community, self-reported pledges for local activities, number of organizations donating funds for civic associations, and government funding for local organizations. This dimension comprises all elements that cause, foster and nurture social cohesiveness.

- **Sense of community (Cincinnati):** The Cincinnati region is one of several metropolitan areas involved in the Social Capital Benchmark Survey. The Greater Cincinnati Foundation sponsored the survey locally. The survey measures various aspects of civic ties and community connections, including social trust, political participation, civic leadership and associational involvement, giving and volunteering, faith based engagement, and informal social ties. This indicator also reports the percentage of eligible voters that actually vote.

- **Trust in respondent's neighborhood (Lansing):** A survey is conducted to collect data and build an indicator to show how much citizens trust people in their neighborhood (Lansing, Power of We)
- **Trust in respondent's neighborhood (Boston):** According to the Boston Public Health Commission, 81% of Bostonians surveyed in 2008 felt that residents are willing to help their neighbors and at least 70 % of residents felt this level of trust in their own neighbors.

Other common indicators under this dimension are: the count of organizations giving to the community to support vulnerable populations in the community, self-reported volunteer participation of citizens in local initiatives, self-reported perceptions of how citizens can influence local government, voter turnout, and the count of neighborhood associations. Communities group of engagement indicators to work together for goals such as social cohesiveness in the community (e.g. number of associations), this goal can be thought of being part of the social and cultural dimension.

G. Resource Sufficiency and Functional Integrity

Using the criteria created to categorize the indicators according to the perspective of sustainability they invoke showed that 67.7% of all indicators in the sample characterize a FI value system (table 8). These indicators reflect strategies aimed at securing the capacity and resilience of social and ecological systems. However, it may also be the case that most indicators suggest FI because communities have so many indicators that related to the human condition. Since communities have been able to develop the social-cultural, psychological and engagement

dimensions more completely, these indicators reflect a deeper understanding of the interrelatedness of the factors associated with those dimensions.

Table 8. Indicators of sustainability categorized according to resource sufficiency and functional integrity value system

	RS	%	FI	%	Total
North Central					
Cincinnati	5	35.7	9	64.3	14
Grand Rapids	22	57.9	16	42.1	38
Lansing	14	32.6	29	67.4	43
Minneapolis	5	19.2	21	80.8	26
Northeast					
Baltimore	8	25.0	24	75.0	32
Boston	63	33.9	123	66.1	186
Philadelphia	10	66.7	5	33.3	15
Southwestern PA	4	14.3	24	85.7	28
Washington DC	20	57.1	15	42.9	35
South Central					
Boulder	20	33.9	39	66.1	59
Central Texas	82	43.2	108	56.8	190
Tucson	16	25.4	46	74.6	62
Southeast					
Atlanta	6	66.7	3	33.3	9
Chattanooga	24	52.2	22	47.8	46
Durham	11	28.2	28	71.8	39
Jacksonville and Northeast FL	15	13.6	95	86.4	110
West					
Olympia	7	53.8	6	46.2	13
Oregon	24	26.4	67	73.6	91
Sta Monica	23	26.1	65	73.9	88
Sustainable Seattle	18	17.1	87	82.9	105
Grand Total	397	32.3	833	67.7	1229

Fewer indicators address planned actions to secure the provision of resources; 32.3 percent of indicators were categorized as RS. In six cases (Grand Rapids, Philadelphia, Washington D.C.,

Atlanta, Chattanooga and Olympia WA), a larger proportion of indicators reflect the RS view of sustainability. With the exception of Olympia WA, these communities are among the newer CSEs working with indicators. Possibly, newer efforts follow more strictly the theoretical recommendations of giving equal attention to the three basic dimensions of sustainability, which implies that they possibly have to account for resources included in economic and ecological and biophysical dimensions. In fact, this was the case for Grand Rapids; this community accounted for water and pollution to water bodies from the perspective of the provision of the resource to the community, whereas other communities are more likely to account for the provision of safe water resources as much for the health of consumers as for the health of ecosystems.

Having more than ten years of reporting and more than five editions of their reports define more experienced CSEs, these communities are deemed older efforts despite that there are cases (e.g. Olympia) in which the community is older than 10 years and could also be deemed older. However, longevity was determined here according to time and the level of activity in the frequency of report editions (>5). Older and more experienced communities have built customized indicators by collecting data through local surveys. The new indicators are less traditional in the sense that they link economy, the environment and social matters with more weight on social matters. For instance, the factors within the ecological and biophysical dimension are commonly linked to human health; economic factors are linked to the necessary income for all sectors of society to have a just level of wellbeing. This type of indicator tilted analysis of indicators towards the FI perspective because the indicators are seen as reflecting measures within a systemic appreciation of the community, with communities focusing on the functionality of the elements making up the system. For instance B-Sustainable from Sustainable

Seattle reports an indicator for happiness that is constructed with data collected by annual surveys. Their survey includes questions that elicit respondents' self-reported perceptions of safety, access to recreation and health levels, as well as their perceptions of environmental protection and environmental quality. For this analysis, this indicator fits within the psychological dimension within the FI approach.

Other less sophisticated examples of these less traditional indicators, are used by the Cities of Tucson, Santa Monica, Boston, Oregon, Cincinnati, and Sustainable Seattle; they have indicators of neighborhoods' perception of safety and trust that are constructed using data collected by the cities. The key factor in the level of sophistication of CSEs and the type of indicators they construct is their longevity and the revisions they make in their work through time.

1. The interaction between FI and RS and the dimensions of sustainability

When observing the indicators separated by dimensions and by sustainability values, the data shows further evidence that newer organizations are more concerned with resource sufficiency strategies and focus more on 'Ecological and Biophysical' and 'Economic metrics'. Table 9 shows the distribution of indicators across the dimensions and values of sustainability as a percentage of total indicators by city. The same dominant tendencies previously discussed are observed; a higher percentage of indicators of FI emphasize the 'Social and Cultural' dimension.

Table 9. Proportion of indicators by city, categorized under sustainability value and dimensions of sustainability

Resource Sufficiency							Functional Integrity					
Region / City	Ecological and Biophysical	Economic	Social and Cultural	Psychological	Engagement	% RS	Ecological and Biophysical	Economic	Social and Cultural	Psychological	Engagement	% FI
North Central												
Cincinnati	7.1	21.4	7.1	0.0	0.0	35.7	21.4	7.1	21.4	14.3	0.0	64.3
Grand Rapids	36.8	10.5	7.9	2.6	0.0	57.9	2.6	0.0	2.6	36.8	0.0	42.1
Lansing	4.7	14.0	7.0	7.0	0.0	32.6	7.0	0.0	34.9	18.6	7.0	67.4
Minneapolis	3.8	7.7	7.7	0.0	0.0	19.2	23.1	0.0	50.0	0.0	7.7	80.8
Northeast												
Baltimore	9.4	12.5	3.1	0.0	0.0	25.0	6.3	3.1	31.3	34.4	0.0	75.0
Boston	3.8	10.8	17.7	1.6	0.0	33.9	9.7	6.5	29.6	8.1	12.4	66.1
Philadelphia	20.0	46.7	0.0	0.0	0.0	66.7	0.0	0.0	26.7	0.0	6.7	33.3
Southwestern PA	0.0	14.3	0.0	0.0	0.0	14.3	28.6	7.1	42.9	3.6	3.6	85.7
Washington DC	20.0	11.4	17.1	5.7	2.9	57.1	34.3	2.9	5.7	0.0	0.0	42.9
South Central												
Boulder	1.7	5.1	27.1	0.0	0.0	33.9	10.2	5.1	20.3	20.3	10.2	66.1
Central Texas	8.9	12.6	15.8	5.8	0.0	43.2	6.3	1.1	5.3	33.7	10.5	56.8
Tucson	4.8	14.3	3.2	3.2	0.0	25.4	12.7	0.0	36.5	19.0	6.3	74.6
Southeast												
Atlanta	44.4	11.1	11.1	0.0	0.0	66.7	0.0	0.0	22.2	11.1	0.0	33.3
Chattanooga	23.9	28.3	0.0	0.0	0.0	52.2	28.3	6.5	6.5	0.0	6.5	47.8
Durham	5.1	15.4	5.1	2.6	0.0	28.2	10.3	0.0	10.3	51.3	0.0	71.8
Jacksonville NE FL	0.9	4.5	8.2	0.0	0.0	13.6	6.4	8.2	23.6	25.5	22.7	86.4
West												
Olympia	23.1	23.1	7.7	0.0	0.0	53.8	7.7	0.0	23.1	7.7	7.7	46.2
Oregon	0.0	20.9	3.3	2.2	0.0	26.4	18.7	0.0	36.3	8.8	9.9	73.6
Santa Monica	6.8	10.2	9.1	0.0	0.0	26.1	9.1	10.2	27.3	18.2	9.1	73.9
Sustainable-Seattle	0.0	8.6	8.6	0.0	0.0	17.1	18.1	19.0	29.5	11.4	4.8	82.9

Of the 13 newer efforts (fewer than five editions of their reports), six cases show a greater number of RS indicators: Grand Rapids (57.9%), Philadelphia (66.7%), Washington DC

(57.1%), Atlanta (66.7%), Chattanooga (52.2%) and Olympia (53.8%). Not only do these efforts focus more on resource sufficiency, they also have more indicators related to biophysical and economic measures. Conversely older efforts show more indicators associated with social-cultural measures that reflect Functional Integrity. One could argue that younger efforts tend to focus more on estimates of their economic and biophysical resources in the interest of RS. However, eight of the newer efforts actually show greater concentration of FI indicators. Table 10 shows the distribution of communities across categories of sustainability perspective and longevity of the effort.

Table 10. Distribution of community sustainability efforts across sustainability value system and longevity

	Resource Sufficiency	Functional Integrity
New Efforts	Grand Rapids Philadelphia Washington DC Atlanta Chattanooga Olympia WA	Cincinnati Lansing Baltimore Southwestern PA Tucson Durham Sta. Monica
Older Efforts		Minneapolis Boston Boulder CO Central Texas Jacksonville FL Oregon Seattle (Sustainable Seattle)
	Total: 6	Total: 14

In total, 14 communities use Functional Integrity indicators. All of the older efforts focus on FI. Generally speaking, for communities pursuing FI, the largest concentration of indicators falls

under two dimensions: psychological and social and cultural. The exception is Boulder CO; despite its principle focus on FI, its largest concentration of indicators within in any classification are social and cultural indicators categorized as RS because they account for status of the population specifically as a work force (i.e., how availability of workforce is affected by Boulder county population by race/ethnicity, age distribution, median age, and speaks a language other than English at home).

For all FI communities, the fewer indicators fall under the economic dimension. Perhaps communities choose not to work with economic indicators because there are governmental organizations already providing this information, or perhaps they lack funding to create such regional indicators. Yet older communities that have worked with indicators for more than 10 years do not show larger numbers of economic indicators. In fact the older they are, the fewer economic indicators they reported (see, for example, Boulder, Jacksonville and Sustainable Seattle). This could reflect that they have found that social-cultural, psychological, and engagement indicators to be more important. If that is the case, then communities reflect agreement with Orr's (2002) observation that the barriers to a graceful transition to sustainability, whatever forms it may take, are not so much technological as they are social, political, and psychological.

Based on the relative importance they assign to different type of indicators, communities are redefining a hierarchical order of factors that should be observed when implementing sustainability; evidence suggests that economic, and to some extent ecological and biophysical,

dimensions are less important than indicators that inform policies addressing individual and social needs.

2. Comparison by region, dimensions of sustainability and by the longevity of CSE

Because one of the more observable tendencies is the concentration of indicators under the social and cultural dimension, indicators for each dimension are divided by region to explore potential associations of a region with attention to a particular dimension of sustainability. Table 11 shows this distribution.

Table 11. Percentage of indicators by dimension of sustainability and region of origin

Dimension	Regions				
	North Central	Northeast	South Central	Southeast	West
Ecol. and Biophysical	26%	20%	15%	21%	18%
Economic	13%	19%	13%	18%	23%
Social and Cultural	34%	42%	27%	23%	38%
Psychological	23%	11%	35%	25%	13%
Engagement	4%	8%	10%	14%	7%
Total	100%	100%	100%	100%	100%

The Northeast region shows a greater concentration of social-cultural indicators (42%) than other regions; three out of the five cities in this region have more indicators for FI, which involves a higher concentration of social-cultural indicators. The same applies for the West and North

Central regions, where 38% and 34% of all indicators are for the social and cultural dimension, respectively.

Another relevant comparison is made using the number of indicators that every city reports in relationship to dimensions of sustainability. All communities with more than five editions and with more than 100 indicators in their reports are considered large. As previously shown in Table 6, the cities of Boston, Central Texas, Jacksonville, and Seattle (B-Sustainable) report the largest sets of indicators. Figures 11 and 12 show how large efforts differ slightly in the way they determine priorities of work for the community. The smaller CSEs are comprised almost entirely of newer efforts, and because of this a relatively larger concentration of indicators of ecological-biophysical and economic dimensions is observed (Figure 11). The larger (and generally longer) efforts (Figure 12) seem to have shifted more attention to social-cultural, psychological and engagement matters. The biggest difference is in attention to ecological and biophysical matters. One explanation may be that most CSEs go through a similar learning process, and as they get more experienced they shift attention from RS indicators to FI indicators and a concomitant larger number of social and cultural indicators relative to the other dimensions.

The criteria used to distinguish between large and small efforts was both having over 5 editions of their reports and over 100 indicators. If CSEs were classified based on longevity (number of reports) alone, Minneapolis and Boulder would have been classified as large. All of the conclusions drawn from this analysis were re-explored including Minneapolis and Boulder in the group of large CSEs, and the results changed little from what is reported here.

Figure 11. Distribution of indicators across dimensions of sustainability for the 16 smaller sets of indicators (comprising 638 indicators)

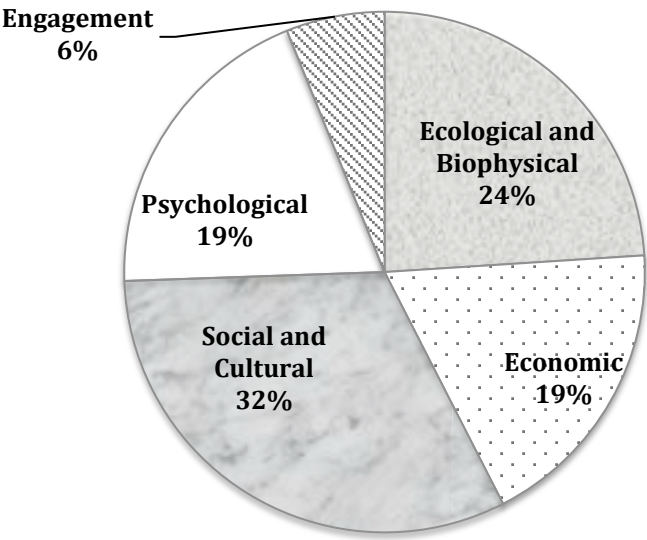
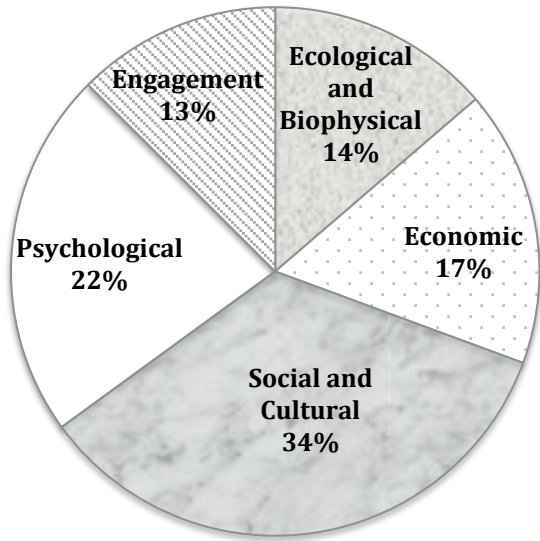


Figure 12. Distribution of indicators across dimensions of sustainability for the four largest sets of indicators (comprising 591 indicators)



3. **Types of Indicators**

The categorization of indicators according to the typology developed for this research required learning about the objectives linked to the indicators and the frameworks in which they were interpreted. Thinking of indicators as signals of change and observing whether indicators are descriptive (more static) or diagnostic (more complex and therefore more dynamic), one can make inferences about how dynamic communities are in terms of observing and fostering community development. During the course of this research it became evident that, depending on the analytical framework applied by the community, a descriptive indicator serving as a goal may become diagnostic (according to the interpretation given in this research). Subsequently, this diagnostic indicator is supported by several other descriptive indicators that are assumed to have a multiple cause-effect relationship.

When a framework of analysis was not provided by a CSE, most indicators were categorized as descriptive (unless the report was explicit and indicated that a particular single indicator was used as diagnostic). In some cases single indicators were deemed as diagnostic in isolation, and this was most frequently observed when communities included an indicator created by another entity, such as the clean air index created by the US EPA. Given this mix of criteria in how communities use either descriptive or diagnostic indicators, using this distinction between descriptive and diagnostic to evaluate how dynamic communities are could not be done. Instead, the number of indicators of each type for each community is used to make inferences about how communities understand and delimit their own systems. The number of reports produced by each CSE since its initiation could potentially be used to help understand how dynamically communities are pursuing community development; however, reports are released either

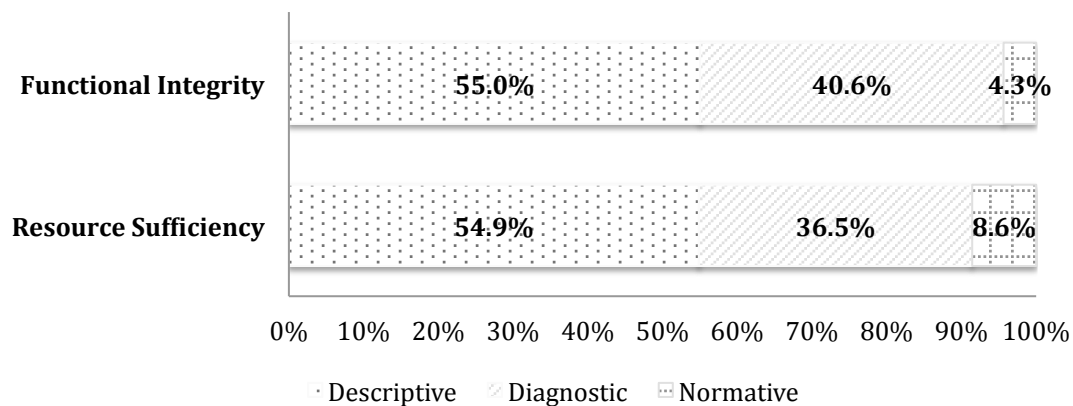
annually or biannually and do not generally reflect actions taken between reports. Also, old reports were not available to compare with current ones, which could have shown how indicators evolved within a given community.

For all the cases, 39.3 percent of indicators are considered diagnostic and 55 percent are descriptive. As shown in figure 13, the diagnostic and descriptive indicators are distributed relatively evenly across sustainability perspectives. The expectation that communities working toward FI might have more diagnostic indicators, reflecting a better understanding of the interrelatedness among the factors depicted by the indicators, is not supported.

The third category of indicators for this typology is normative indicators. This category includes all indicators associated with some desirable change described by a community. Since the judgment of the researcher may cause bias in categorizing these indicators, a way to reduce subjective choices is to learn from the background information provided by the community for each indicator. Therefore, the basic criterion was if the indicator was related to an innovative/changing action within that community. For instance, in the context of reducing carbon emissions, some communities have indicators for the number of people using alternative means of transportation (bicycles). However, if a general carbon emissions community goal was not stated in the report, the count of bike users would simply be a descriptive indicator, rather than normative. As seen in Figure 13, the percentage of normative indicators in the sample was not high. However, normative indicators represented almost twice the proportion of indicators associated with RS as compared to FI. A larger number of normative indicators associated with FI was expected based on the presumption that the FI requires a more systemic understanding of

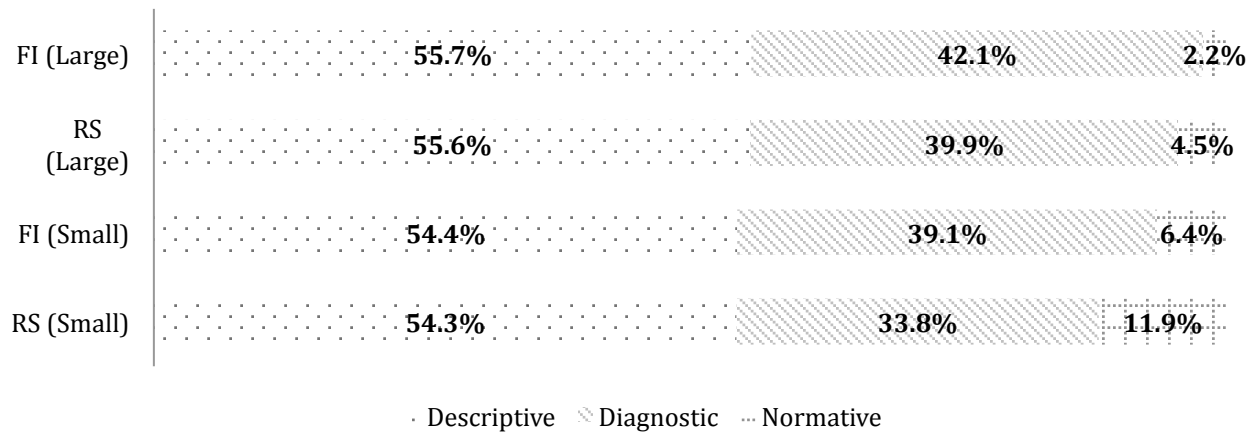
the community and, as a result, a clear idea of where change is needed. There were more normative indicators within the RS perspective because of how communities accounted for the provision of resources, especially alternative energy sources and emissions reduction strategies. For the most part, normative indicators are generically descriptive because they serve a single point of observation.

Figure 13. Distribution of types of indicators by functional integrity and resource sufficiency



A comparison of the use of descriptive, diagnostic and normative indicators by older (≥ 10 years of work, ≥ 5 report editions, > 100 indicators) and newer (all those not characterized as older) communities is shown in figure 14. The purpose of the comparison is to identify whether time and experience make a difference in the mix of types of indicators. The expectation is that because communities that have been using indicators longer have also made more revisions to the indicators they use, these communities should be moving toward using indicators that better serve their intentions of observing and fostering change.

Figure 14. Type of indicators by sustainability value system for larger, older vs. smaller, newer CSEs



As shown in figure 14, the largest difference is observed for normative indicators for the newer communities with a RS perspective. That is, indicators related to initiatives seeking change are more common among the newer CSEs.

H. Conclusions and Summary

1. What types of community sustainability indicators are found across community sustainability efforts?

For the 20 CSEs included in this study, communities generally focus on less traditional measures of progress. There are fewer indicators for standard economic measures of growth. Instead, the indicators they use capture metrics for elements that make cities more enjoyable, for example indicators for recreation, community structure (e.g., walking distances to services), cultural enhancement, social equity in access to services (e.g., health, education, safety) and civic

engagement. The large number of non-traditional indicators may be evidence of communities' desires for transformation; that most indicators are within the social and cultural dimension may suggest a desire for cultural transformation.

The number of years that the cities had been working on building indicators is correlated with the number of indicators reported. Older organizations report more indicators and older organizations with at least five editions of their report show: i) a more elaborate framework for analyzing the indicators, and ii) a higher number of customized indicators. Younger CSEs report traditional standard measures, focusing more on covering the ecological and biophysical dimensions – as if sustainability is understood as preservation of the environment or pollution abatement. The analysis shows that older communities have expanded sets of indicators to capture not only traditional measures of well-being but also less traditional measures (e.g., cultural enhancement, access to healthy food, and levels of trust among neighbors). One conclusion is that older CSEs appear to take a broader approach to capture observable effects of the interrelatedness among sustainability dimensions.

However, in all reports, indicators related to the provision of basic needs seem to be the default (e.g., number of people living under the line of poverty, access to health, and access to education). Some organizations address structural factors within the community (e.g., diversity of gender and race in leadership positions). Older efforts address factors related to the engagement of citizens in the improvement of their living conditions and other measures related to the conditions needed for civic action to happen (e.g., amount of philanthropic donations made to civic organizations, number of civic organizations, and measures of volunteerism).

The creation of new indicators by the CSEs breaks away from the technocratic tradition of using regional indicators, in the sense that the local knowledge counts as much as experts' contributions to the choice of indicators. The case of Philadelphia is particularly pertinent to this observation. Philadelphia, like other communities, designed a set of indicators that responded to the city's need to observe social change to create a culture of sustainability. What makes this case unique is the way in which this CSE is measuring change; they regularly ask those individuals in charge of each initiative and elicit information about the actual rate of progress (measured in percentage of goal achieved) for each of the actions. These self-reported percentages are averaged by each of the dimensions of sustainability and are interpreted by the CSE as a measure of change.

2. What constitutes sustainability for communities?

This research tries to understand how communities interpret sustainability using two approaches. The first is by organizing indicators according to the dimension of sustainability they can be ascribed to. The second is by categorizing the indicators according to whether they correspond with the criteria for either Resource Sufficiency or Functional Integrity.

a) Dimensions of Sustainability

For the dimensions that indicators address, some guidance seems to be taken from the dimensions of sustainability suggested by theory, as most communities address economic, environmental and social dimensions. However, the communities' choices of indicators are not distributed evenly across these different dimensions. Most indicators in this study are related to the aspects of sustainability related to people and their conditions: engagement dimension 9%, psychological dimension 21%, and social and cultural dimension 33%. That these dimension

together contain 63% of the indicators from among the 20 CSEs is strong evidence that communities understand sustainability in terms of cultural transformation and working with people's behaviors and attitudes. The work of these communities places people at the center of sustainability, implying attempts to transform society through the enhancement of desirable community aspects (recreation, culture, healthy lifestyles, safety, trust) rather than focusing on individuals as consumers and macroeconomic policies to modify consumers' behavior.

Not only do the CSEs interpret sustainability in terms of people and communities, they seem to be able to gather information to reflect their understanding of sustainability. Younger efforts tend to be simpler and cover basic dimensions (economic, environmental and social). But older efforts have built more complex sets of indicators and are inclined to use more indicators of the social-cultural dimension. Two possible reasons for this include: 1) that the people in the groups choosing the indicators become more informed and experienced about how to implement sustainability and therefore their indicators become more complex, and 2) as the CSEs mature, the communities are perhaps able to obtain more funding to build customized indicators.

As communities develop a deeper understanding of the actions and goals they list under each dimension, they begin developing their own sub-divisions within each dimension. These sub-divisions represent deeper interpretations of principles that then become strategies or actions. The engagement dimension used in this study was developed as a result of this. In broader terms, other communities may implicitly consider the engagement-dimension as a sub-dimension of the social and cultural dimension. The expectation, then, is that these CSEs develop more expertise; they will be better able to do identify additional sub-divisions for their understanding of

sustainability. The case of B-Sustainable (Sustainable Seattle) gives a hint about how it is beginning to group indicators under goals that are like sub-dimensions. For instance, under the economic dimension (what they labeled the built dimension), they have stipulated goals for sustainable transportation and responsible land use, isolating critical elements believed to require special public attention. In terms of sustainability, this collective analysis and deliberation is an enrichment of the process.

b) The issue of aggregation

All communities in this study are ethnically and economically diverse and experience problems common to most cities/communities in the country. However, this does not necessarily imply that they represent the goals and initiative of most cities across the country. This is particularly important when thinking about scaling up these community efforts. The local emphasis of these indicators may be challenged if evaluated in terms of larger regions' goals. Simon Dresner argues that sustainability is a “global problem, requiring global coordination of action” and that leaving all decisions to local communities is “not very different than the neoliberal solution of leaving everything to the market to decide” (Dresner 2002 p 139). The disadvantage of multiple communities acting in their own interests is could be likened to the tyranny of small decisions (Kahn 1966). In other words, will an aggregation of community sustainability planning decisions equal sustainability at a regional scale? While that question falls outside the boundaries of this study, the fact that the older and more experienced organizations are providing advice and coaching younger organizations could result in some objectives being shared across different communities. The case of Jacksonville and North East Florida is an example. This CSE is helping launch community sustainability and indicator projects in Baton Rouge, Louisiana; Clay County, Florida; and Roanoke, Virginia. Also, the CSEs and indicators analyzed here show

strong similarities when the goals driving the efforts are considered. In a way, this combining of efforts tests whether local value systems can be observed in larger regions.

The issue of small versus large-scale efforts is also being addressed through the combination of many county efforts into larger-regional efforts. For instance, Central Texas started as a local effort in Austin that later grew to include surrounding counties. Similarly, the Southern Pennsylvania CSE includes several counties, and the B-Sustainable initiative providing indicators for Sustainable Seattle is today a nationally recognized organization that provides guidance in the use of community sustainability indicators.

c) *Functional Integrity or Resource Sufficiency*

This research evaluated whether indicators responded to either a resource sufficiency (RS) or functional integrity (FI) value system for sustainability. For RS, indicators were analyzed to determine whether serve a purpose related to planned actions to secure the provision of resources to support human existence. For FI, this research evaluated the indicators in light of actions that secured capacity and resilience of social and ecological systems. FI dominated; 14 communities out of 20 have a larger percentage of indicators related to FI (67% of the total count of indicators). That most indicators fell on the FI side of the evaluation suggests several things: i) that CSEs are indeed developing a systemic appreciation of their communities; ii) that more weight is placed on developing diagnostic indicators that capture the interrelatedness of factors within the community, increasing understanding of relationships among factors; and iii) that, when the FI result is combined with the result that utilitarian values are not dominating the work of CSEs (based on how the dimensions of sustainability are reflected), communities are focusing

on factors that capture the general wellbeing of the community, as well as of individual community members, and the ability of community members to work together.

d) *How are these community interpretations of sustainability similar to or different from theoreticians' interpretations in the literature?*

Communities embrace principles of sustainability selectively and apply them according to their own understanding and to solve their own problems. Also, they do not necessarily adopt principles wholesale; rather they seem to make interpretations in response to their needs and work towards satisfying the interests of local community members, local organizations and local visions for a better life. Thus, the approach taken by many communities in developing indicators seems to embrace a less comprehensive set of principles when compared with the breadth of recommended principles for sustainability suggested by the literature. Nevertheless, these communities are taking on the challenge of moving from theory to practice; no report of indicators analyzed for this research shows actions that might be considered counter to the theoretical principles of sustainability.

Likely, asking CSEs to approach sustainability as comprehensively as does academic literature is unreasonable given the complexity of community issues and the costs of generating indicators and then implementing actions to bring to practice each one of the multiple theoretical recommendations. What seems to be happening is that different entities generating indicators within and across communities are beginning to consolidate their work and to compare results under the networks of different CSEs. This might result in integration for the interpretation of Sustainability at larger scales or at least more homogeneity in the selection and application of

principles. The case of B-Sustainable Seattle is an example of this expansion. Over time, this CSE has incorporated a larger geographic area, expanded its set of indicators, and developed a more sophisticated framework of analysis that can be accessed by others on a web based platform.

Although it is argued that a critical shortcoming of CSIs is the absence of needed data at the local scale and the perceived inconsistency of some components with long term sustainability (Talberth, Cobb et al. 2007), this criticism comes from a tradition that sees the development of indicators as a technocratic process. Communities are developing their own data, for their own indicators. Whether the data is consistent across communities is a legitimate question. However, consistency is irrelevant to community members if the purpose of the indicators and data is to signal an intended change or improvement responding to local plans. Nevertheless, local value systems that result in local indicators may be spreading as indicators are shared and compared among communities.

When looking at the longevity of these efforts, it is important to acknowledge that communities are showing a level of engagement in this process that may or may not last and building social institutions that may or may not remain functional over the long term (e.g., a hundred years). It is evident by the continuity of their reports that there are some long-term intentions and there is a learning process involved that requires the members of these organizations to adapt information and adjust to changes. This adaptation is consistent with the co-evolution argument developed by Norgaard (1984) in the sense that as social and ecological conditions change as a result of human actions, human actions eventually change to adapt to new conditions. As an example of the long

term commitment of these organizations, Jacksonville and North East Florida has been publishing an indicators report for over 26 years; this effort is one of the most comprehensive in the sense that it covers broadly the five dimensions of sustainability evaluated by this research. The Jacksonville and North East Florida initiative may not have started as a sustainability effort 26 years ago, but it now evidences the adaptation of the organization behind the effort, incorporating newer knowledge and responding to social changes with sustainability as a goal.

I. What this Research Cannot Answer

The results of this research show what types of sustainability indicators are most frequently constructed by communities and describes them in terms of dimensions of sustainability and two value systems proposed by Thompson (2007). The results also provide increased understanding of differences and similarities between theory and practice. The ground is set for future research to explore the extent to which these local interpretations of sustainability affect policy-making. Also, future research might be conducted to understand the multiple factors that may have influenced the formation of these organizations. Little is known about the motivators of these collective efforts and how these motivators relate to issues of representativeness, democracy, governance, and long term planning.

General Conclusions

From the first chapter in this dissertation three main lessons are drawn. First, elements of modernization that remain are the system's approach, a direct contribution of structural functionalism. Also, globalization is identified as a direct effect of modernization and as a driving force of development that is void of any influence of the SD principles of justice and equity.

Second, the foundations of development were generated within sociology; however its influence faded as the implementation of modernization expanded, and economics took a more prominent role in informing development theory and policy. After environmental concerns made compulsory the incorporation of the environment in development decisions, contributions from ecology merged with economic theory. The methodological assumptions of this interdisciplinary approach were challenged by critics, and this promoted theoretical and methodological advances that gave way to the emergence of post-normal approaches to the complex problems posed by SD in which open participation and transdisciplinarity became prominent. In this new context disciplines are expected to contribute in the advancement of methods of inquiry and research that incorporate those approaches.

Third, SD became a field of knowledge with rapid transformations and taking new directions. These transformations occurred at the discourse level, with elements that included: rejection of the hegemonic dominance of the east-west divide, rejection of the determinism of expert knowledge, a more open questioning of the epistemology of disciplines, acknowledgement that there are limits to current knowledge, appreciation for diversity in culture and knowledge,

embracing of complexity, open participation in the process of planning for development, a recognition that social decisions cannot be made in technocratic isolation, and the realization of the need of transdisciplinary inquiry to address wicked problems of SD.

The effort, in chapter 2 to build a common understanding between three constructions of sustainability, offers four essential messages. First, regardless of apparent similarities, heuristics used to explain sustainability across fields of study and the principles generated from these heuristics reflect underlying values that can be incompatible, which causes inconsistencies that affect implementation. Therefore caution is warranted for efforts to combine knowledge about sustainability at the shallow level of heuristics. This is especially critical when combining practices from different constructions of sustainability.

Second, combining knowledge on sustainability is desirable, but debating at the level of practices that stem from principles (across and within fields of study) may create gridlock in decision-making. Bringing the debate one level deeper from practices to values helps to clarify the purpose of the practices and may facilitate deliberation.

Third, as hard as it is to agree on values, being explicit about what values a group or community wishes to serve with every action within sustainability plans (part of the rationale for each action) could reduce conflict. Finally, a set of principles drawn from across the work on sustainable agriculture, business and development are sufficiently universal that they can be deemed **minimum standards for labeling an initiative sustainable**. The standards emerge as characteristics of sustainability.

- A community implementing sustainability should not commit only to one type of sustainability because this restricts the breadth and depth of the effort.
- Consideration of the interactions among communities and with the region should be part of sustainability visioning and planning.
- Long term planning and attention to intergenerational impacts is a central part of sustainability.
- Communities or stakeholders engaged in sustainability initiatives should be clear about the values that they want to serve with any given action and about the diversity of values they ascribe to sustainability.

The analysis of the work of CSEs provides a set of findings that shed light on the differences between the theory and practice of sustainability. For instance, younger CSEs report simpler indicators (less interrelation among elements measured); of all communities, some of these younger efforts have more indicators related to a resource sufficiency value system. Conversely, older efforts report more complex and customized indicators. All older (more expert) efforts report indicators that focus on the functional integrity value system. In reference to indicators according to dimension of sustainability, the least common are those that can be deemed traditional economic indicators, but the number of these indicators is similar to the number of biophysical-ecological indicators. Finding that communities pay much less attention to economic and environmental indicators than the literature is crucial because the literature stresses the importance of the environment for improvements in the quality of life. However, these communities actually focus more on reporting a larger number of indicators related to the social, cultural, psychological and engagement dimensions. All are related to the human condition.

Of the trending methodological advances found in the literature, the need to incorporate environmental concerns in development decisions is among the most salient ones. Surprisingly more experienced communities express an understanding of sustainability that treats the economics and environmental dimensions with relatively less importance than is the case in academic literature. That some communities fall back on economic indicators measured at the national level may reflect a view that these are sufficient; alternatively data at the community level may be difficult to obtain. The limited focus on environmental indicators may very well result from the urban focus of the CSEs; however, the proportion of indicators in the biophysical and ecological dimensions may reflect lack of understanding of the scientific information stating the importance of the contributions of the quality of the environment to social-wellbeing. Alternatively, this may show that attention to environment is seen as important but communities find it more important to expand the focus on the social-cultural dimension. At the end, environmental problems are also social problems that require change in attitudes and behavior of society. The social and cultural indicators deal with a number of efforts that seek gradual cultural transformations, for instance, increasing the level of trust among citizens or trust towards governmental agencies; increasing the level of artistic events; increasing perceived levels of safety; and increasing levels of equity in gender and race.

Because sustainability is a global matter and not a localized one, questions about whether addressing sustainability at the community level will meet needs that arise at a larger scale are reasonable. It appears that communities are addressing this issue and reaching some resolution. Some communities have decided, after some years of work, to merge their efforts. Some older

efforts function as mentors for newer efforts in a process that results in the sharing of policies and indicators associated with sustainability.

Because of the high variability of the types of indicators reported, no dominant understanding of sustainability appears to be informing these efforts. The older efforts are more comprehensive in the incorporation of a variety of indicators that relate to a broader number of dimensions and some identifiable principles of sustainability. This gives the signal that there is a learning process ongoing, from early efforts in which indicators tend to be simpler to more experienced efforts with more complex use of indicators.

There is evidence that the reports of indicators may reflect values other than just utilitarian. The dominant value system in the understanding of sustainability is functional integrity (67% of the total count of indicators). That most indicators fell on the FI side of the evaluation suggests several things: i) that CSEs are indeed developing a systemic appreciation of their communities; and ii) that more weight is placed on developing diagnostic indicators capturing the interrelatedness of factors within the community and increasing the understanding of relationships among factors.

Seeing that most communities report indicators that fall within the FI value system, and that economic indicators are among the least reported, it appears that utilitarian values are not dominating the work of CSEs. Also, the fact that the largest concentration of indicators is under the social-cultural, engagement and psychological dimensions (all related to the human

condition) signals that it is possible that these communities are expressing universal and benevolent types of values.

Sustainability for these communities is not fully based in any theoretical paradigm. It is an eclectic combination of sustainability actions that render a wide array of sustainability interpretations. The newer efforts do incorporate more theoretical recommendations into their programs than older efforts, but more experienced efforts have abandoned the theoretical structure (of dimensions at least) in favor of crafting their own visions of desired change relative to what they think is important for their urban settings, a greater focus on people.

While this research looked at how sustainability is understood and demonstrated in CSEs, a deeper look into these efforts could help answer several other questions that arose in the process of conducting this work. For instance, it would be important to learn:

- What motivates the formation of these groups and how representative are they of their communities? Are there special conditions that can be replicated to stimulate the formation of these groups somewhere else?
- How do community groups make difficult decisions about indicators? Do they apply transdisciplinarity? What are the criteria that guide these decisions?
- What types of values do community initiatives believe sustain each one of their actions?
- How do community efforts define “long-term” and guarantee their long-term continuity, and how do they incorporate moral obligations to future generations (if any) in this process?

- This research shows a static analysis of the work of CSEs; it would also be interesting to observe the progression of these efforts through time in order to understand determinants of change, the learning process they go through, and the potential changes to underlying values.

APPENDICES

APPENDIX A LIST OF SUSTAINABILITY PRINCIPLES

Table 12. Principles of sustainable development, sustainable agriculture and corporate social responsibility

Sustainable Development Principles	
<i>Principle: an idea that forms the basis of something (Merriam-Webster)</i>	
World Commission on Environment and Development (1987)	
Challenges	<p>Limit extreme rates of population growth</p> <p>Sustain the potential of food security</p> <p>Protection of Species and Ecosystems: resources for development</p> <p>Energy efficiency and low energy paths based on renewable resources</p> <p>Industrial production: Higher productivity (meet increasing demands), increased efficiency and decreased pollution</p> <p>Increasing urbanization requires attention and resources to provide land, services, and facilities needed for adequate human life (clean water, sanitation, school and transport)</p>
Strategic Imperatives	<p>Revive economic growth: increasing per capita income in developing nations as poverty relief strategy</p> <p>Change the quality of growth: make it less-material and energy-intensive, and more equitable in its impact</p> <p>Meet the needs and aspirations of an expanding developing-world population</p> <p>Ensuring a sustainable level population in both developed and developing countries</p> <p>Conserve and enhance the Earth's natural resource base</p> <p>Reorient technology (key link between humans and nature) towards environment and managing risk (safety of systems and environmental risks of new technologies)</p> <p>Merge environment and economics in decision making</p>
Role of International Economy	<p>Enhancing the flow of resources (financial and SD expertise) to developing nations</p> <p>Linking trade with development and environment</p>

Table 12 (Cont'd)

	Trans nationals have impact on both environment and resources of other countries and the global commons. Both host and home countries of Trans nationals should strengthen policies Broadening the technological base for developing nations (diffusion and building capacities)
World Economy	Rapid economic growth in both industrial and developing countries Freer market access for the products of developing countries Lower interest rates Greater Technology transfer Larger capital flows (concessional and commercial) Increase multi-lateral dialogue
H. Daly (1990)	
Economic	Harvest rates of renewable resources should equal regeneration Waste emission should equal nature's assimilative capacity Regenerative and assimilative capacities should be treated as natural capital Substitutability of man made capital for natural resources shall be understood as very limited
Environmental	The rate of exploitation of non-renewable resources shall be limited to the rate of creation of renewable substitutes Emphasize on technologies that increase resource productivity (development) rather than resource throughput itself The scale of the economy must be within the carrying capacity of the region Growth is limited to an optimal scale relative to the biosphere, after that it is anti-economic growth Economic growth is desirable but redistribution aimed to reduce wealth inequality
Social	Limits on population size and per capita resource usage Trade off between population size and per capita resource usage
Holmberg and Intl. Institute for Environment and Development (1992)	
Economic	Increase productivity of goods and services Satisfying basic needs or reducing poverty

Table 12 (Cont'd)

	Environmental	Improving equity Biological productivity Genetic diversity Ecological Resilience
	Social	Cultural Diversity Social Justice Gender Equality Participation
National Research Council (1999)		
	To be Sustained	
	Nature	Earth Biodiversity Ecosystems
	Life Support	Ecosystem Services Resources Environment
	Community	Cultures Groups Place
	To be Developed	
	People	Child Survival Life Expectancy Education Equity Equal Opportunity
	Economy	Wealth Productive Sectors Consumption
	Society	Institutions Social Capital States Regions
Middleton and O'Keefe (2001)		
	Economic	Market prices for environmental goods (because markets do not reflect values)
	Environmental	Biodiversity, avoidance of system collapse (because nature is not pristine but constructed)

Table 12 (Cont'd)

	Social	Stability and equity (because communities are destroyed and built by market forces)
O'Connor (2006)		
	Political	Capacity of community, citizens participation Coordination, power and governance Shaping the rules and limits to markets Regulation of what counts as environmental value
National Research Council (2013)		
Sustainability for the Nation: Resource Connection and Governance Linkages [Priority Domain and Issue Areas]		<p>Connections among energy, food, and water: The availability and abundance of affordable supplies of energy, food, and water are vital to sustaining healthy populations and economic prosperity.</p> <p>Diverse and healthy ecosystems: Ecosystems and their components and functions provide “services” to human communities—for example, in terms of water supplies and quality, coastal storm buffers, productive fisheries, pollination, air pollution absorption, and soil quality along with many extractive and other uses of resources.</p> <p>Enhancing resilience of communities to extreme events: There is a significant need to assess infrastructure and community vulnerabilities to natural and human-caused disasters and to develop more coordinated strategies for addressing them.</p> <p>Human health and well being: Clean air and water, nutritious food, regular physical activity, and protection from toxic exposures and injuries are among the requirements for human health and well-being; each of these is affected by sustainability initiatives.</p>
Sustainable Agriculture Principles		
Douglas (1984)		
Agriculture as food sufficiency , concerned with the permanent availability of resources (soil, water and crops) to produce food and their respective demands.		<p>Estimating future demand for food</p> <p>Estimate the supply of economically useful agricultural resources, and their productivities or yields per unit of resource</p> <p>Pursue technological advancements to increase productivity</p> <p>Observe environmental costs arising from expansion of food supplies</p>

Table 12 (Cont'd)

Agriculture as stewardship , which translates as the ecological view.	<p>Honor biophysical constraints of nature on capacity to produce food</p> <p>Reduce depletion (pollution or overuse) of renewable and non-renewable resources</p> <p>Limits on consumption / limits on population levels</p>
Agriculture as community , in which is included those concerned with the values of community.	<p>A community is made up of individual living things, including human beings, whose lives most deeply affect one another</p> <p>Richness of relationships within some communities produces a richness of experiences for individuals even more than conventional measures of success such as wealth and power</p> <p>Social relations within human community should be cooperative rather than competitive</p> <p>Humans must establish a sense of duty to the Earth showing respect for the complexity of natural processes and relations rather than seeing nature as something to be tamed and brought under control</p> <p>Justice refers to the norms of equalized opportunities for all members of a community</p> <p>Resist the centralized forces of technology and organization, rather seek popular participation for greater economic, racial, and sexual equality</p> <p>Reject Green Revolution practices with ecological effects: intensive cropping practices, the use of pesticides, or introduction of mechanical innovations</p>
National Research Council (1991)	
Sustainable Agriculture	<p>Improve the underlying productivity of natural resources and cropping systems so that farmers can meet increasing levels of demand in concert with population and economic growth.</p> <p>Produce food that is safe, wholesome, and nutritious and that promotes human well-being</p> <p>Ensure an adequate net farm income to support an acceptable standard of living for farmers while also underwriting the annual investment needed to improve progressively the productivity of soil, water and other resources</p> <p>Comply with community norms and meet social expectations</p>

Table 12 (Cont'd)

National Research Council (1993)	
Sustainable Agriculture in the Humid Tropics	<p>Maintain the long term biological and ecological integrity of natural resources</p> <p>Provide economic return to individual farmers and farm related industries</p> <p>Contribute to the quality of life of rural populations, and</p> <p>Strengthen the economic development strategies of countries in the humid tropics</p>
National Research Council (2010)	
Towards Sustainable Agricultural Systems in the 21 st Century	<p>Satisfy human food, feed, and fiber needs, and contribute to biofuel needs.</p> <p>Enhance environmental quality and the resource base.</p> <p>Sustain the economic viability of agriculture.</p> <p>Enhance the quality of life for farmers, farm workers, and society as a whole</p>
Corporate Social Responsibility Principles	
Carroll (1991)	
Economic Components	<p>Perform in a manner consistent with maximizing earnings per share.</p> <p>Be committed to being as profitable as possible.</p> <p>Maintain a strong competitive position.</p> <p>Maintain a high level of operating efficiency.</p> <p>A successful firm is defined as one that is consistently profitable.</p>
Legal Components	<p>Perform in a manner consistent with expectations of government and law.</p> <p>Comply with various federal, state, and local regulations.</p> <p>Be a law-abiding corporate citizen.</p> <p>A successful firm is defined as one that fulfills its legal obligations.</p> <p>Provide goods and services that at least meet minimal legal requirements.</p>

Table 12 (Cont'd)

Ethical Components	<p>Perform in a manner consistent with expectations of societal mores and ethical norms.</p> <p>Recognize and respect new or evolving ethical/moral norms adopted by society.</p> <p>Prevent ethical norms from being compromised in order to achieve corporate goals.</p> <p>Good corporate citizenship is defined as doing what is expected morally or ethically.</p> <p>Recognize that corporate integrity and ethical behavior go beyond mere compliance with laws and regulations.</p>
Philanthropic Components	<p>Perform in a manner consistent with the philanthropic and charitable expectations of society.</p> <p>Assist the fine and performing arts.</p> <p>Managers and employees participate in voluntary and charitable activities within their local communities.</p> <p>Provide assistance to private and public educational institutions.</p> <p>Assist voluntarily those projects that enhance a community's "quality of life."</p>

APPENDIX B LIST OF CITIES

Table 13. List of cities and reports with URL location for the reports

	City	Report Year	Document and URL Link of the Report's location
1	Atlanta	2009	2008-2009 Sustainability Report for Atlanta: Sustainable Atlanta http://www.sustainableatlanta.org/report/Sustainability%20Report.pdf
2	Baltimore	2010	Baltimore Sustainability Plan http://www.baltimoresustainability.org/sites/baltimoresustainability.org/files/Baltimore%20Sustainability%20Plan%20FINAL.pdf
3	Boston	2009	Summary of Boston Indicators Report http://www.bostonindicators.org/~media/Files/IndicatorsReports/Reports/Indicator%20Reports/Indicators2009.pdf
4	Boulder	2009	Boulder County Trends: The community Foundation's Report on Key Indicators http://www.commfound.org/files/TRENDS-2013-LoRes_0.pdf
5	Central Texas	2009	2009 Data Report: Central Texas Sustainability Indicators Project http://www.canatx.org/CAN-Research/Reports/2010/ar2009.pdf
6	Chattanooga	2009	Climate Action Plan http://media.timesfreepress.com/docs/2010/04/Chattanooga_Climate_Action_Plan.pdf
7	Cincinnati	2005	Sustainable Cincinnati: Regional Indicators, Measuring the Economic, Environmental and Social Health of the Tri-state Metropolitan Area http://sustainablecincinnati.org/sc_2005.pdf (*)
8	Durham	2011	Community Indicators Progress Report http://s3.amazonaws.com/zanran_storage/www.durhamnc.gov/ContentPages/2508920432.pdf
9	Grand Rapids	2008	Community Triple Bottom Line Indicator Report http://grcity.us/enterprise-services/Documents/11686_TBLFinal.pdf
10	Jacksonville	2010	Quality of life progress report for Jacksonville and Northeast Florida http://www.otsego.org/qol/Research/10%20QOL%20Summary%20Jacksonville.pdf

Table 13 (Cont'd)

11	Lansing	2007	The Power of We http://powerofwe.org/ (*)
12	Olympia	2006	An Indicator Research Paper for the Sustainable Community Roundtable http://www.sustainablesouthsound.org/wp-content/uploads/2011/05/Report2006.pdf
13	Oregon	2009	Achieving the Oregon Shines Vision: Highlights, 2009 Benchmark Report to the People of Oregon http://www.unitedwayblc.org/sites/unitedwayblc.org/files/2009_Benchmark_Highlights.pdf
14	Philadelphia	2010	Progress Report Green works Philadelphia http://www.phila.gov/green/greenworks/pdf/MOS_AnnlRprt2010.pdf
15	Pittsburgh	2004	Sustainable Pittsburgh: Southwestern Pennsylvania Regional Indicator Report 2004 http://www.sustainablepittsburgh.org/pdf/2004Indicators.pdf
16	Santa Monica	2006	Sustainable City Plan: City of Santa Monica http://www.smgov.net/uploadedFiles/Departments/OSE/Categories/Sustainability/Sustainable-City-Plan.pdf
17	Seattle	2006	Indicators of Sustainable Community http://www.zipcon.net/~laura/SustainableSeattleSustainabilityReport2006.pdf
18	Tucson	2000	The livable Tucson vision program http://www.ci.tucson.az.us/livable.html (*)
19	Washington	2010	Washington DC Neighborhood Sustainability Indicators Project: Pilot Project Overview Report http://greenlivingdc.org/files/101130_NSIP_Overview_Final.pdf
20	Minneapolis	2011	Minneapolis Living Well: Sustainability Report http://www.ci.minneapolis.mn.us/www/groups/public/@citycoordinator/documents/webcontent/convert_271457.pdf

(*) The reports are no longer available in the original URL three years after this analysis was made.

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