

SUSTAINABLE ECONOMY II: SUSTAINABILITY MODELS¹

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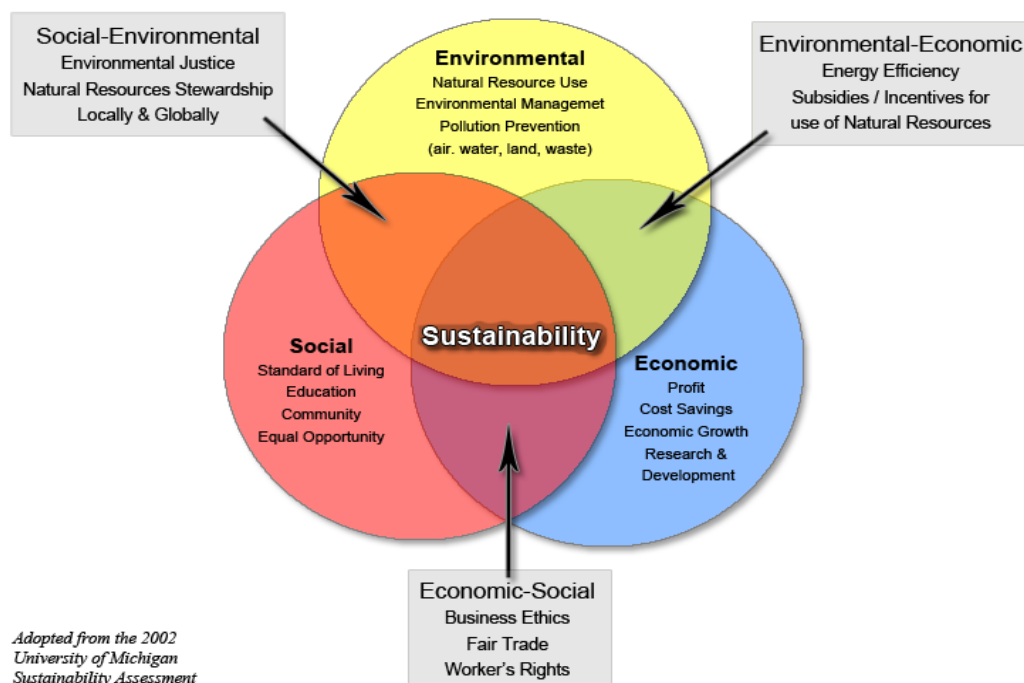
Models and diagrams can help us understand relationships, inter-relationships, concepts, processes, and outcomes. Often, at the same time, such models and diagrams serve to raise or focus questions and challenges for further clarity and/or explanation. A number of different models have been used in attempts to describe sustainability and sustainable development.

1. Three Spheres of Sustainability – Overlapping Circles

This model (Fig. 1) has been around a while and has been used by many organizations and individuals to promote and/or justify sustainable development. In this approach, sustainability means finding innovative ways of living today which improve or sustain our well-being, and which do not impair the future. The model tells us that if we are to respond assertively and appropriately to the challenges communities face, we need to consider the three spheres of sustainability: Environment, Economy, and Society.

Figure 1. Sustainability at Vanderbilt University.²

The Three Spheres of Sustainability



¹ This paper is a 'work in progress' – the new model will be revised through further discussion; all input welcome.

² Vanderbilt University. 2009. Sustainability at Vanderbilt University. (Adopted from the 2002 University of Michigan Assessment) www.vanderbilt.edu/sustainvu/images/sustainability_spheres.org.

Environment is defined as our natural systems, our ecosystems, and our ecological heritage. Included are: plants, animals, insects, oceans, rivers, and lands. Also to be considered here are decisions which result in pollution, deforestation, extinction, climate change and so on.

Economy is identified as our economic- and capital-created systems. The concept includes the vitality of individual nations, the wealth of society, and the prosperity of actions for individuals and businesses. It considers decisions that impact employment, pricing, trade, markets, industries, fair trade, affordable housing and food, and so on.

Society is defined as our social institutions and relations between them, including how communities can be strengthened and become more livable. It considers decisions that impact government, friends, social groups, sport activities, tourism, volunteerism, political issues, equity, justice, racism, war, marginalized social groups and so on.

This model is predicated upon making sustainability-supporting decisions which consider all three spheres equally and holistically, in science, in design and engineering, in policies, and in education (the “triple bottom line”). Today, many communities, provinces, states and countries espouse the principles of sustainability but continue to struggle when it comes to providing adequate well-being for their citizens, often making decisions which weaken the future for the next generation. These decisions can result frequently in communities over-consuming their natural resources, establishing farmland by eliminating natural habitat, decreasing farmland by converting it to residential developments, isolating neighbours through home and neighbourhood designs, and promoting economic growth through short-term industries.

My major criticism of this model is that it illustrates the economic and the society spheres operating, to a large degree, outside the environmental sphere, when we know that the economic sphere is entirely dependent upon the environmental and society spheres.

2. Three-Legged Stool

Sustainability has often been described as a three-legged stool (Fig. 2) – one leg each for the environment, social, and economic aspects, with the legs of the stool connected by supporting braces. Society, economy, and environment are equally valued in this model. The rationale behind the three-legged stool is that if one leg is removed, or is not as strong as the others, the stool will collapse.

Not many people consider the role of the ‘bench’ in this model. The bench (e.g. government, business, community, or other human organization that seeks to be sustainable) keeps all legs firmly together. But what is unclear to me is: in today’s world, what or who sits on the top of the stool? I ask this question because we have seen the stool symbology portrayed also as a stool with one long leg (economic) and two substantially shorter legs (environment and social), which is quite reflective of our current way of doing business. We have also seen that, with some skill at juggling and maintaining balance, one can sit on a stool with only one leg. In our current way of thinking, this one leg is economic.

The same major criticism used above for the model shown in Figure 1 is the same for the three-legged stool approach. Clearly, the symbol of the three-legged stool representing sustainability is inappropriate. Humanity is once again placed outside the environment. Current neoclassical economic approaches have no connectivity with the ecological capital, thus placing no value on biodiversity or the ecosystem functions that enable life itself. The three-legged stool model

suggests that, if we balance equally our economic needs, social well-being, and the environment, we can simply carry on, business as usual. But, as Dawe and Ryan (2003)³ pointed out,

“...humanity can have neither an economy nor social well-being without the environment. Thus, the environment is not and cannot be a leg of the sustainable development stool. It is the floor upon which the stool, or any sustainable development model, must stand. It is the foundation of any economy and social well-being that humanity is fortunate enough to achieve.”

3. Three Spheres of Sustainability – Concentric Circles

A second example of the three spheres of sustainability model is shown in Figure 3. Society (people, communities, nations, etc.) and the Economy (businesses, markets, policies, etc.) it creates and maintains are both nested in the Environment Sphere, and are therefore bound by its limits and capabilities. As is shown in the model, Society is nested entirely within the Economy Sphere. In my opinion, this is the biggest drawback of the model – the economy just does not and cannot exist outside the Society Sphere. This model has never attained any credibility with industry or senior governments as it is viewed as a model which severely constrains economic activity and development. This, despite the fact that it has a sounder basis than the models shown in Figures 1 and 2.

Figure 2. The three-legged stool model of sustainability.

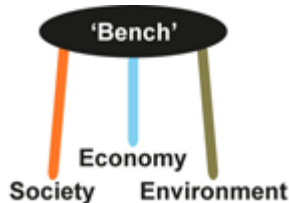


Figure 3. The concentric circle model of sustainability.



4. Community Capital Model

The above models are not that helpful in showing the overall concept of community sustainability, nor illustrating the extent to which human factors impact community well-being. The more sophisticated Community Capital Model (Fig. 4) balances six forms of capital, managed sustainably with community guidance, to ensure long-term sustainable community development. Community Capital is the foundation for sustainable development.⁴ Each triangle (Fig. 4) represents the ways in which we can strengthen the form of capital. Roseland defined the six capitals as:

- (1) **Natural capital** is any stock of natural assets which yields a flow of valuable goods and services into the future. For example, a forest, a fish stock or an aquifer can provide a

³ Dawe, N.K. and K.L. Ryan. 2003. The faulty three-legged-stool model of sustainable development. *Conservation Biology* 17 (5): 1458–1460.

⁴ Roseland, M. 2005. *Toward sustainable communities. Resources for citizens and their governments.* New Society Publishers, Gabriola Island, BC.

harvest or flow which is potentially sustainable year after year. The forest or fish stock is the natural capital, and the sustainable harvest is natural income.

Figure 4. Community Capital Model of sustainability.



- (2) **Physical capital** is the stock of material resources such as equipment, buildings, machinery and other infrastructure which can be used to produce a future flow of income. The origin of physical capital is the process of spending time and other resources constructing tools, plants, facilities, and other material resources which can, in turn, be used to produce other products. Improving physical capital includes focusing on community assets such as public facilities; water and sanitation; efficient transportation; safe, quality housing; adequate infrastructure and telecommunications.
- (3) **Social capital** is the relationships, networks and norms which facilitate collective action, or the shared knowledge, understandings, and patterns of interactions which a group of people bring to a productive activity. Social capital refers to the organizations, structures and social relations which people build up themselves, independent of state or corporation. Social capital is the glue which holds our communities together. Western-style capitalism can weaken social capital to the extent that it promotes competition and individualism over cooperation and community.
- (4) **Human capital** is the knowledge, skills, competencies, and other attributes embodied in individuals which facilitate the creation of personal, social and economic well-being. Increasing human capital requires a focus on areas such as health, education, nutrition, literacy, and family and community cohesion. Basic determinants of health such as peace and safety, food, shelter, education, income, and employment are necessary prerequisites.
- (5) **Cultural capital** is the product of shared experience through traditions, customs, values, heritage, identity and history. Cultural capital is particularly important in aboriginal communities and other communities with a long history. In mainstream Western society, it

is too often under-valued. Enhancing cultural capital implies attention to traditions and values, heritage and place, the arts, diversity, and social history.

(6) **Economic capital** refers to the ways we allocate resources and make decisions about our material lives. Economic capital should be maintained for people to live on the interest, or income. Strengthening economic capital means focusing on: making more with less (maximizing use of existing resources and using waste as a resource); circulating dollars within the community; making things ourselves; trading fairly with others; and developing community financial institutions.

How to Capitalize³

The major criticism I have of this model is that it does not provide any boundaries indicating ecological limits. And yet we must learn to live on our natural income (annual productivity; annual yield; annual harvest) rather than deplete our natural capital. Economic growth with an ecological deficit is anti-economic and makes us poorer rather than richer in the long term. Sustainability requires that we minimize our consumption of essential natural capital.

Community capital and social equity demand that we find more ways of living more lightly on the planet. We have to increase the efficiency of our energy and resource use. We have to reduce our present and projected levels of material and energy consumption. The critical resource for strengthening community capital is not money – rather, the critical resources are trust, imagination, courage, commitment, the relations between individuals and groups, and time. We must explicitly aim to nurture and strengthen community capital in order to improve our economic and social well-being. Government and corporate decisions should be reviewed for their effects on all forms of community capital. Programs and policies need to be established at every level to ensure that community capital is properly considered. The key to understanding this approach is recognizing that it is based largely on appreciation of community assets as well as realistic acknowledgement of community deficits.

Community Engagement³

Communities must be involved in defining sustainability from a local perspective. The dilemma is how to encourage democracy (e.g. participatory local processes) within a framework of sustainability. Elements of this framework include minimizing consumption of essential natural capital and improving physical capital, which in turn require more efficient use of urban space. This sustainability framework also includes strengthening economic capital, increasing human capital, multiplying social capital and enhancing natural capital.

There are legitimate causes for concern over the dislocations, economic costs and potential inconveniences associated with sustainability measures and their distribution across society. Both the gain and the pain of adjustment should be shared fairly across the community. Participation in the decision process by affected groups can help make the attendant redistribution costs and benefits fairer and more widely understood. Democratic mobilization is essential to the achievement of such adjustments.

Sustainable development strategies should favour:

- bottom-up rather than top-down approaches;
- redistribution over ‘trickle-down;’

- self-reliance over dependency;
- a local rather than a regional, national or international focus; and
- small-scale projects rather than megaprojects.

As well they should:

- be designed with extensive public participation;
- seek to improve society as well as the environment and the economy; and
- result in increased equity, equality and empowerment.⁵

Democracy is an inherent part in the sustainable development process. Sustainable development must be participatory development. Real visions for change rarely come from government or from the marketplace, but from civil society.⁶ For people to prosper anywhere they must participate as competent citizens in the decisions and processes which affect their lives. Sustainable development is thus about the quality and quantity of empowerment and participation of people. Sustainable development therefore requires community mobilization, i.e., mobilizing citizens and their governments to sustainable communities. Economic growth and development are not just about quantity but also about quality and diversification.

It's important to note that each community will have a unique mix of natural, physical, human, social, cultural, and economic capital, and that each community is located somewhere on a community sustainability continuum ranging from 'not engaged' to 'fully engaged' with the changes that must occur to guarantee vibrant and resilient futures.

5. Five Capitals Model

The Five Capitals Model (Fig. 5) was developed by the Forum for the Future, located in Great Britain.⁷ Three of the capitals are the same as those in the Community Capital Model; economic capital is split into manufactured and financial capital; and cultural capital is not included as a separate entity. The definitions of the capitals are very similar to those used in the Community Capital Model.

The Twelve Features of a Sustainable Society

The Forum for the Future has also supported the Five Capitals Model with what they have called ***The Twelve Features of a Sustainable Society***. By describing how a sustainable society should appear, the 'twelve features' model helps organizations evaluate the sustainability of their projects. The features fit into the separate five capitals. If we invest appropriately in all capital stocks, and achieve the flow of benefits we anticipate, the following statements would be true. They represent the outcome of a successful capital investment strategy for sustainable development - that is, a sustainable society.

⁵ Brohman, J. 1996. Popular development: rethinking the theory and practice of development. Oxford: Blackwell Publishers, London, UK

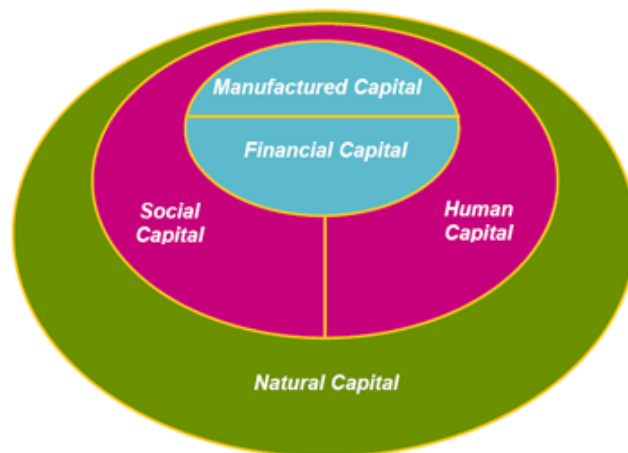
⁶ Newman, P and J. Kenworthy. 1999. Sustainability and cities: overcoming automobile dependence. Island Press, Washington, DC.

⁷ www.forumforthefuture.org/projects/the-five-capitals

Natural Capital

- In their extraction and use, substances taken from the earth do not exceed the environment's capacity to disperse, absorb, recycle or otherwise neutralize their harmful effects (to humans and/or the environment).
- In their manufacture and use, artificial substances do not exceed the environment's capacity to disperse, absorb, recycle or otherwise neutralize their harmful effects (to humans and/or the environment).
- The capacity of the environment to provide ecological system integrity, biological diversity and productivity is protected or enhanced.

Figure . The Five Capitals Model of Sustainability.



Human Capital

- At all ages, individuals enjoy a high standard of health.
- Individuals are adept at relationships and social participation; and, throughout life, set and achieve high personal standards of their development and learning.
- There is access to varied and satisfying opportunities for work, personal creativity, and recreation.

Social Capital

- There are trusted and accessible systems of governance and justice.
- Communities and society at large share key positive values and a sense of purpose.
- The structures and institutions of society promote stewardship of natural resources and development of people.
- Homes, communities and society at large provide safe, supportive living and working environments of Manufactured Capital.
- All infrastructure, technologies and processes make minimum use of natural resources and maximum use of human innovation and skills.

Financial Capital

- Financial capital accurately represents the value of natural, human, social and manufactured capital.

Assessment of the Model

The Five Capitals Model does contain a boundary which illustrates the concept of ecological limits, and include the economy (manufactured and financial capital) within the human-social capital sphere – these are significant steps forward. The main thing to keep in mind currently is that the world is operating under an economic paradigm which implies that the human enterprise is operating as if it were an open, growing system functioning more or less independently of nature. Natural resources are priced at zero (prices reflect only extraction and labour costs), and we assume that technology can substitute for any depleted resource or life-support function: hence, resource shortages are a non-issue and there are no serious constraints on growth.

The Forum for the Future believes that we are facing a sustainability crisis because we are consuming our stocks of natural, human and social capital faster than they are being produced or replaced. Unless we control the rate of this consumption, we cannot sustain these vital stocks in the long-term. They believe that by maintaining and trying to increase stocks of these capital assets, they can live off the income without reducing the capital itself. But for this to happen, it is the responsibility of every organization, business or otherwise, to manage these capital assets sustainably. Sustainable development is the best way to manage these capital assets in the long-term. It is a dynamic process through which organizations can begin to achieve a balance between their environmental, social and economic activities.

6. Three Spheres of Sustainability – A New Mental Map

A third ‘three spheres of sustainability’ model is shown in Figure 6. The substantial and highly significant change from the models shown in Figures 1 and 2 is that everything is placed within the ‘Ecology’ sphere. This approach builds on that illustrated in Figure 3 and adds considerably more substance to the model. Stokes (2007) stated:

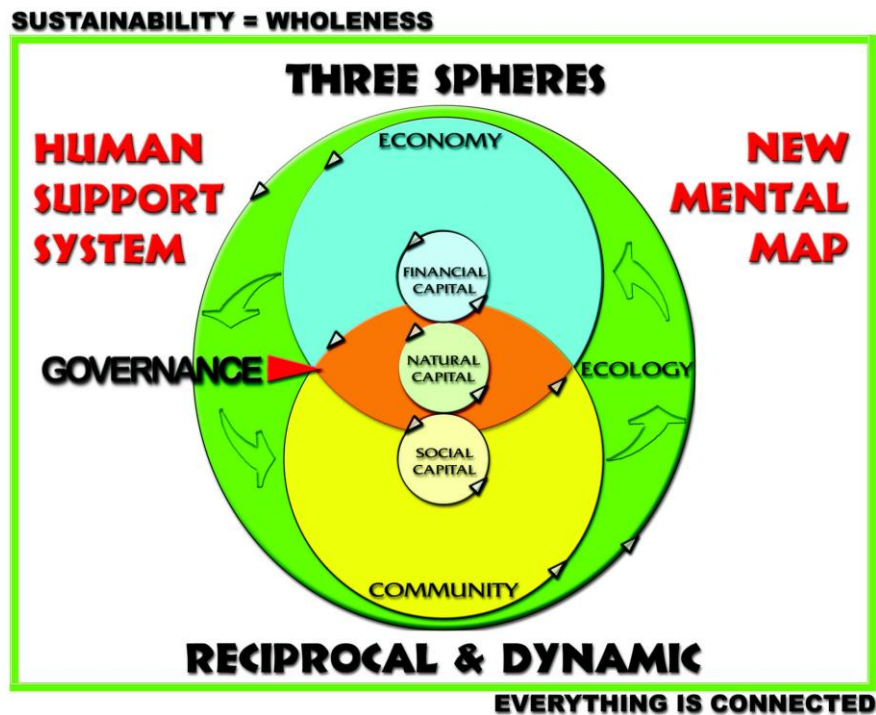
“Because sustainability is about wholeness...about the ongoing, inter-looped processes of a whole system. Sustainability is not about permanence...or holding onto something. It’s not about something fixed and controllable...going on as it always has in a linear fashion. It’s about something complex and dynamic and non-linear and reciprocal. It’s about a new way of thinking that requires us to hold lots of different things in our heads at the same time, and focus more on the relationships between things rather than the things themselves. It’s about ‘whole systems thinking.’”

In Figure 6, the Kauaian Institute from Hawaii has presented the mental map for how this model works. The model is based on three inter-related spheres, ecology, economy, and community, each with its constituent capitals and own dynamics. The relationships among these three spheres drive sustainability. This model requires that sustainability thinking considers all three spheres simultaneously.

For decades we have considered the economy sphere was the whole thing inside which everything was nested. Everything else was deemed an “externality,” perhaps even constraints on the economy sphere. Our leaders considered that financial capital was the core, and preached that the economy sphere ruled the world. Now, in the new mental map, the economy sphere is inter-looped with and fundamentally shaped by the community sphere. Figure 6 also shows us that social capital is at the center of the community sphere, and is shown to be at least as important as financial capital. Stokes (2007) defined social capital as managing our

housework and community work which, when quantified, has been shown to have a true value rivaling that of our economy. The mental map also shows us that both the economy and community spheres are themselves completely embedded in the ecology sphere. The implication here is that our natural capital is more vital than anything else because our human system would not function at all without the services provided by our ecosystems.

Figure 6. Kauaian model of sustainability.⁸



The “new mental map” has boldly gone where few other sustainability models have ventured – into governance and politics. This orange area where the spheres overlap in Figure 6 is where the authors believe that people come together to simultaneously manage all three spheres. The Governance area shows us the intersection of economy, community and ecology. In the authors’ view, this is an important addition to a sustainability model because: (a) politics should not be about conflict, only about integration, (b) politics should not be about choosing which sphere will dominate, because that is not a choice we can make, (c) politics should not be a balancing act among spheres, as we are so often told it is, or (d) politics should not be about the tradeoffs of one sphere versus the other.⁷

Figure 6 tells us that one of the secrets to sustainability is integration. We need to better understand the interrelationships between all three spheres all the time – only then will we be able to do an effective job of integration. There are a couple of daunting conclusions from the Kauaian Institute paper:

⁸ Stokes, F.K. 2007. Kauaian Sustainability: It’s Not What You Think...It’s How. Keynote address: Apollo Kaua`i L.E.G.S. Sustainability Conference. The Kauaian Institute. 13 October 2007. http://kauaian.net/sus101/LEGS_Keynote_Stokes.pdf.

- If we need to be simultaneously managing our financial, social and natural capital for system sustainability, most of what we have been doing for the past several hundred years has been precisely the wrong approach.
- One of the enormous challenges facing us today and into the future is the integration of all of our human behavior and practice to constitute a positive feedback loop for system sustainability.

The ‘new mental map’ from the Kauaian Institute is a refreshing change from previous attempts to portray sustainability models realistically. While it raises a number of questions and challenges, it defines sustainability on a sounder footing, and does a much better job of illustrating inter-relationships.

7.0 Spheres of Sustainability – A New Model

As new and as enlightening as Figure 6 is, I do not think that it reflects completely the realities of what a sustainable economy should be. For example, Figure 6 illustrates how the economy sphere is inter-looped with and fundamentally shaped by the community sphere. If we review the goal I defined for a sustainable economy:

sustain a desirable quality of life by facilitating relationships among people and between people and their natural environment,

we can see that the economy is but one tool through which society (the community) can achieve sustainability, and this goal of sustainability must be achieved within ecological limits, and certain social and cultural limits. Thus, the economy sphere should be completely nested within a community well-being sphere (Fig. 7).

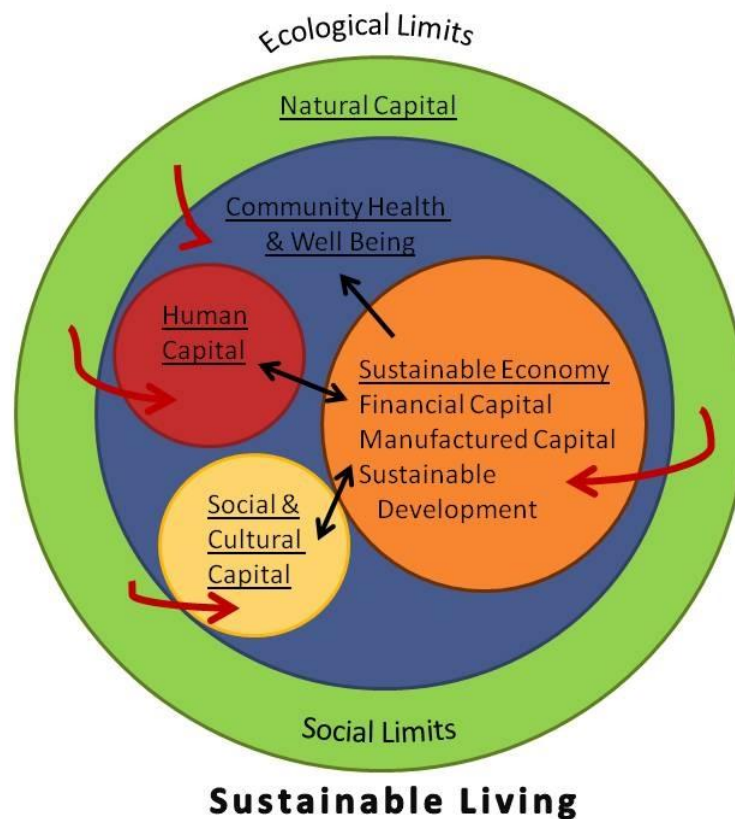
The ecological limits and social limits are clearly defined in Figure 7. Ecological limits (natural capital) are quite easy to define – quite simply the ability of our natural and designed ecosystems and landscapes to sustain life. Social and cultural limits (contained within the Community Health & Well-Being Sphere) are more difficult to define because they involve human judgment and behaviour. I define social/cultural limits as (a) those embedded within the laws and statutes of our governance and justice systems, (b) the basic human values espoused by society; and (c) the moral and ethical directions compatible with sustainable living.

There is an obvious, logical and substantive connection between social/cultural capital and human capital. Human capital is determined by, for example: population density; birth and death rates; population health; level of education; skills and expertise; degree of socialization; age; gender; emigration and immigration rates and patterns; and settlement densities and patterns.

The natural capital sphere allows us and every other organism to live on this planet. Since it is a living system, it is self-regenerating. As long as we do not impair ecosystem and landscape capability to regenerate naturally, we will be operating within the ecological limits of natural capital. We do not have a good, widespread understanding of the ability of our ecosystems and landscapes to self-regenerate. And, we have not demonstrated a meaningful willingness or capacity to share the planet with other organisms. In this model, natural capital includes the right to life, the right to adequate habitat and space, and the right to be free of human influence for all organisms on the planet.

The sustainable economy sphere is shown completely nested with the larger sphere of community well-being. This is done in this manner because it is my belief that the economy is limited completely by the natural capital, human capital, and social/cultural capital available through the community. As we have seen recently (last 10 years) in British Columbia and Canada, the rate of change in our natural capital has been escalating, and there have been dramatic changes experienced in the sustainable economy, human capital and social/cultural capital spheres. That is why it is important to keep the focus of sustainable living on the goal of a sustainable economy: *to sustain a desirable quality of life by facilitating relationships among people and between people and their natural environment.*

Figure 5. Spheres of sustainable living.⁹



In other words, it is important to keep a semblance of balance and stability in times of challenging change. Our reactions in the past have generally been to focus on the economy, social or environment spheres to solve particular within-sphere problems. Those issues which overlap different spheres have generally been dealt with within the economy sphere (“...for the best interests of the majority...”); the decisions with a narrow knowledge base have sometimes served, for example, to perpetuate environmental degradation, poverty and homelessness, and abuse of different segments of the community.

⁹ The capitals used in this model are similar to those identified for the Community Capital Model, the Five Capitals Model, and as defined in: Porritt, J. 2007. *Capitalism as if the world matters*. Earthscan, London, UK.

While there are a number of questions and issues which this model generates, there are two which should be addressed first. The first question is: Should the human capital, social/cultural capital and sustainable economy spheres be shown to overlap as in Figure 6. For the moment, I have chosen to keep them separate with inter-linking arrows showing the relationships between them. I have chosen to leave them separate because of the second question: How does one allude to governance in Figure 7? When one chooses a system of governance, it will then be possible to decide if the spheres should be shown to overlap.

The more significant aspects of this model are:

- (1) the natural capital includes the rights of all flora, fauna, and micro-organisms;
- (2) the sustainable economy sphere is nested entirely within the community well-being sphere;
- (3) the spheres of human capital and social/cultural capital are not nested in or overlapping with the sustainable economy sphere to indicate that neither source of capital should be subsumed and exploited by the sustainable economy sphere;
- (4) a sustainable economy must be guided by ecological as well as social/cultural limits, and these limits will vary from location to location, community to community, family to family, person to person;
- (5) if the model is working effectively, the sustainable economy sphere will have direct positive impacts on the natural capital and community well-being spheres, and there will be no net negative impacts, e.g., related to environmental impacts (including pollution), which exceed the carrying capacity of the ecosystem or landscape to absorb these impacts;
- (6) if the model is working effectively, all infrastructure, technologies and processes make minimum use of natural resources and maximum use of human innovation and skills; and
- (7) sustainable development is a tool (not an objective) available to engender community sustainability and stability.

8.0 Conclusion

I have always had a better feeling for the ability of a model to illustrate where we have been than in its predictive capability. But there is considerable benefit to discussing aspects of strategic models which might be utilized to be creative, innovative, and inclusive when it comes to building a new, sustainable economy. As this new model is a work-in-progress, please send your comments and opinions to me (info@bcise.com, or dan@danlousier.com). Thank you.

Compiled and synthesized by:

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