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A Step Towards Sustainable: The Meshing of the Mormon Church Headquarters' Environmental Earth Stewardship Practices With Modern Trends of Sustainability

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A STEP TOWARDS SUSTAINABLE: THE MESHING OF THE MORMON CHURCH HEADQUARTERS' ENVIRONMENTAL EARTH STEWARDSHIP PRACTICES WITH MODERN TRENDS OF SUSTAINABILITY

by

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Abstract

Planners and landscape architects are decision makers whose commitment to sustainable development is integral in transitioning our built environment into a renewable and more self sustaining system. The built environment is a place where the three pillars of sustainability comprising social equity, environmental bear-ability, and economic viability are clearly manifested.

The recent decades or scientific research in this area have offered us opportunities to make changes in the built environment that will better support future generations of our local communities. However, social and religious community structures can make change difficult on the Wasatch Front where the headquarters of the Church of Jesus Christ of Latter Day Saints is located.

This paper addresses how principles of sustainability are incorporated into the built environment based of secular theories of best practice. The building and design of recent LDS Church funded developments will be explored as well for evidence of religiously motivated earth-stewardship practices. It indicates closure of the perceived gap in scientific and religious environmental ideals.

Introduction to Sustainability

Centuries after the Industrial Revolution took place, scientific research, social concern, and pressure to secure robust economies began to recognize the state of our global society. In the late 1980's and early 1990's open worldwide discussion seeped from the whispered term "sustainability". The 1987 Brundtland Commission defined the new term as "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (WECD, 1987). A paradigm shift had been called for. Decades of further research and a "green" trend would follow as various fields would identify practices of sustainability, especially those in the building, planning, and design.

Three pillars, or dimensions, of sustainability were established to better explain the extended impact of such decision making. In the context of building and design, all three dimensions must be taken into account in the decision making (Opdam et al., 2006). The dimensions of sustainability are comprised of:

- The *eco physical* dimension
- The *social* dimension
- The *economic* dimension (Termoshuizen et al., 2006).

The Eco-Physical Dimension

The *eco physical* dimension is defined by natural systems in geography and ecology (Termoshuizen et al., 2006). Careful consideration of these processes and efforts to work with the environment ensures that the future generations will enjoy the beauty and benefits provided by the natural world. The World Conservation Strategy conference of 1980 (with participation from the United Nations Environmental Program,

International Union for the Conservation of Nature, and the World Wide Fund for Nature) popularized the term “sustainable development”. The *eco physical* perspective focused on three principles (IUCN/UNEP/WWF, 1980):

1. Essential ecological processes and life support systems must be maintained
2. Genetic diversity must be maintained
3. The use of species and ecosystems must be sustainable

To contrast, time periods such as the industrial revolution indicate societies actions that dominated and destroyed the environment, although their activities were not perceived as such. History also reveals evidence of societies that worshipped the natural world like many Native American cultures. Significant movement towards eco-physical sensitivity could be marked in US history as early as 1970 with the institution of NEPA, the National Environmental Policy Act.

The Social Dimension

The social dimension is defined by mental and physical health, land use, and the parameters of human perception (Termoshuizen et al., 2006). Development considering the social dimension is sensitive to human needs within the respective cultures, but also seeking to improve conditions of health, activity, and socialization. The United Nations Conference on the Human Environment began to explore socially sustainable development in 1972 when specific actions such as protection of world culture and national heritage was published (McDonald, 1996).

The social dimension of development is best understood from a micro and macro perspective. The micro perspective would deal with how the immediate design of a space

caters to human comfort, movement, health and safety. The macro perspective of socially sustainable development would deal with planning and design that allows access to amenities across social strata and widespread preservation of and advancement of culture.

The intergenerational aspect of this dimension adds another level of complexity. The definition of sustainability stated earlier, “meeting the needs of the present without compromising the ability of future generations to meet their own needs,” ties us closely to coming generation and reminds us of how we have been affected by decisions of those made in the past. The development practices of a generation leave more than a physical legacy, they leave a legacy of beliefs and values. Theses can indicate sensitivity and willingness to adjust to the best available practices of sustainable development. The built environment can reflect the exponentially growing amount of information and knowledge in the world. Lack of innovation in improving systems can reflect overdependence on previous generations.

The Economic Dimension

The economic dimension of sustainability is defined by the build environment’s capacity to produce economic values (Termoshuizen et al., 2006). A capitalist economy, such as the one experienced in the US, is driven by monetary gain. Development must continue to be financially feasible and create places that maintain and encourage economic advancement. Sustainable infrastructure incurs upfront costs sometimes greater than those of conventional development methods. Cost must be offset by savings overtime through efficient maintenance and social or eco-physical benefits.

A Vision: Benefits of Sustainable Practices

ECO-PHYSICAL BENEFITS

- Genetic diversity maintained (IUCN/UNEP/WWF, 1980)
- Healthy water systems (SSI, 2009)
- Natural cycles and processes continued (IUCN/UNEP/WWF, 1980)
- Clean air (SSI, 2009)

SOCIAL BENEFITS

- Healthy and wellness of community increased (SSI, 2009)
- Social and cultural activity encouraged (SSI, 2009)
- Character and heritage of place preserved (McDonald, 1996)
- Access to amenities universally available (Termoshuizen et al., 2006)

ECONOMIC BENEFITS

- Cost effectively implemented and maintained (SSI, 2009)
- Stimulates (local) economic growth (SSI, 2009)

Practices of Sustainable Design: How it is Done

The following section explores successful examples of building and sites that are reaching for the benefits of sustainable practices as outlined in the previous sections. Case studies are evaluated to highlight practices of the eco-physical, social, and economic dimension of sustainability. The benefits are acknowledged.

The 21,000 seat LDS Church Conference Auditorium in downtown Salt Lake City completed in 2000 was a massive undertaking. Covering an entire city block it is a building with a large footprint. It exemplifies, however, many sustainable practices.

Figure 1. LDS Church Conference Center, Salt Lake City, UT. (BYU Journeys, 2010)

In terms of eco-physical sustainability, the building uses local granite which matches other LDS Church buildings in the area. The cost and emissions damages of travel were mitigated by doing this. The expansive roof-top garden is also evident from figure 1. This garden is a complete meadow and a habitat for flora and fauna alike. Roof top gardens reduce the heat-island effect by reducing hard surfaces and replacing it with carbon-cycle catalyzing plant life. The vegetation is native to the intermountain region reducing the amount of irrigation needed to sustain it.

The LDS Conference center also sports a river-like water feature starting on the roof and cascading water-fall like off the front of the building. It is recycled water to reduce excessive water consumption.

Figure 2. Conference Center water feature. (LDS Church, 2010)

Socially speaking, the LDS Conference center enhances the downtown area with its walkable grounds. A stream imitating City Creek trails down the sidewalk

creating an attractive atmosphere. Ample seating is made available accommodating either group gatherings or contemplative visitors. The terraced gardens are an aesthetic amenity as well.

On the economic side, the underground parking relieves the city of acres of surface parking stalls allowing room for continued development of the business disctict of the city. Local business also benefits from the thousands of visitors at the Conference Center for year-round events.

In addition to native or climate appropriate plant use as discussed previously, effective irrigation is source of maintaining healthy water systems. Especially in desert climates, avoiding over-irrigating is important. Technologies such as satellite moisture sensors in irrigation systems can prevent watering when unnecessary. Figure 3 shows s moisture censor attached to the outside of a meeting house.

Groundwater moisture sensors are another form of measuring moisture content in the root zone of vegetation to avoid watering when sufficiently wet. Figure 4 is an illustration of how this works. Such technologies are increasing used by the LDS Church. Benefits of healthy water systems reduce strain on water service infrastructure and maintain natural aquifers and other water cycles.

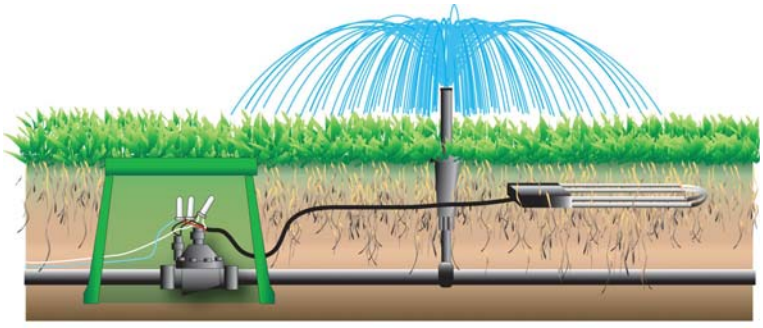

Figure 4. Root zone moisture sensors. (LDS Church, 2010)

Figure 3. Satelite moisture sensor. (LDS Church, 2010)

Figure 5. Baptismal font, Marshal Islands. (LDS Church, 2010)

Figure 6. Sports field on Island. (LDS Church, 2010)

In the Marshal Islands, where fresh water sources are scarce, innovative water recycling features are implemented. Site specific conservation methods should always be evaluated to maximize efficiency. In this example, water that is used in the baptismal font in figure 5 is recycled and used to irrigate the islands only sports field shown in figure 6 (LDS Church, 2010). This is not only an eco-physical amenity, but a social one, as community members can be brought together to recreate and enjoy the benefits of physical activity. It also eases the economic burden of a municipality caring for a sports field. Innovative problem solving typically benefits community members in all three dimensions of sustainability as experienced here.

In the late 1990's, the LDS Church installed water treatment and desalinization facilities at a number of chapels in the Marshal islands as well. They protect against contamination seeping into the limited ground water supply (LDS Church, 2010). This effort to increase water system sustainability benefits thousands of people and seeks to disrupt natural cycles and habitat as little as possible.

Figure 7. Water treatment. (LDS Church, 2010)

Figure 8. Pacific area storm water collection. (LDS Church, 2010)

Figure 9. Bio-swale, Portland OR. (Bonney, 2012)

Another viable form of preserving the integrity of water systems is managing storm water. Keeping storm water onsite is renews aquifers and can be used in place of piped water for irrigation. The LDS Church has utilized rain water collection as a sustainable practice for decades in meeting houses worldwide. The pacific area meeting house rain collection shown in figure 8 is typical..

On site water management is important to maintain healthy water systems. Storm water can also be immediately used for irrigation by draining it into bio-swales. Bio-swales are commonly found along roadways and parking lots. They replace the conventional curb and gutter that guide water off the site for treatment. Bio-swales allow direct drainage into ground water supply and double as a natural irrigation technique. Figure 9 shows a bio-swale with small curb-breaks allow water into the planted median. Bio-swales are similar to detention and retention basins in that they can be aesthetically integrated into a site to function as a visual and environmental amenity. They also ease the strain on water treatment facilities making it an economically viable solution.

Pervious pavement or pavers that allow water percolation between them is another method of onsite water management which lowers heat island effect as well.

LEED Certification is a way of acknowledging measured aspects of sustainable design in a building over its lifetime (USGBC, 2012). It focuses mainly on impact of buildings in social and environmental impacts, but bleeds into site planning and construction processes (USGBC, 2012). Construction methods can be detrimental from machinery and transportation emissions to soil compaction. Understanding the lifecycle of designs helps to see the spectrum of practices in need of evaluation in order to build and design more sustainability.

Aspiring to a LEED certification is a guide to sustainable design. It incorporates sustainable practices that uphold the three dimensions of sustainability. It is not necessary in order to have a sustainable building or site, but acknowledges the effort put forth is reaching a high standard of low impact design.

Figure 10 is the 2009 LDS Church History Library built with special sensitivity to historic documents and media it contains. The building project received a silver rating, the highest being platinum followed by gold, then the silver rating.

Figure 10. LEED certified LDS Church History Library, Salt Lake City, UT. (Jacobsen, 2012)

Figure 11. LEED Logo. (USGBC, 2011)

Figure 12. LDS Temple in Vernal, UT. (LDS Church, 2010)

Recycling materials in response to a holistic view of a site's lifecycle is necessary to sustainable practices. Reusing materials, buying local materials that haven't travelled long distances for fabrication and installation, and using materials themselves that have been renewably extracted and produced benefits the environment. Emissions are reduced and there is no energy used to produce new materials.

Figure 12 shows a building that was recycled. This LDS Temple was previously a historic meeting house. In addition to the eco-physical benefits, retrofitting instead of rebuilding preserves the character and history of the site.

Using materials that have long life cycles is another consideration. Traditionally, our cycle of production and consumption has been linear, meaning that we extract raw materials for fabrication, sell them for profit, use them, and dump them at the end of the line. This linear method contradicts all natural processes of human life and the environment. Most materials we take from the earth can reenter the cycle for one purpose or another. Thinking about recycling in terms of building and site material can help to close the gap in production and consumption.

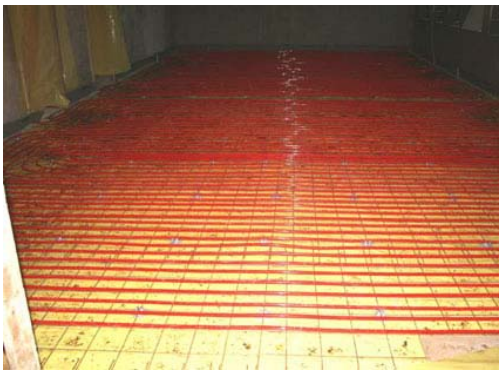

Figure 13. Construction of floor heating, Susanville CA. (LDS Church, 2010)

Figure 14. Chapel with floor heating. (LDS Church, 2010)

Energy efficiency is central to sustainable design. The conventional method of energy production in the United States is over 92% coal based (Hymas, 2010). This means that a fossil fuel is mined, transported, burned and converted into electricity, and transported through power lines to areas of service. Energy efficiency is often stressed when discussing sustainability. To keep up with our increasingly technological world, energy needs are growing as well. In Utah, the rate energy consumption has grown in the last 20 years (Hymas, 2010). Even renewable energy sources are criticized for negatively affecting the environment (Hymas, 2010). There is a clear need to curb the rate of energy consumption and to continue to explore renewable energy sources to reduce the the demand and its following environmental impacts of production.

Heating and cooling buildings are the highest uses of energy (Hymas, 2010). Figure 12 shows an innovative way to do this using a renewable energy source, water. Heated water is run through tubing in the floor, radiating warmth into the areas. Because warmer air rises, even rooms like the high ceiling chapel shown in figure 14 is heated with little energy. The US Department of energy reports that 25-50% energy savings occur with radiant floor heating over conventional methods (USDE, 2012).

Geothermal heating is another alternative energy source that can be part of sustainable design. The LDS Church Office Building in Salt Lake City shown in figure 15 utilizes geothermal energy from four underground spring wells on the building site. The massive pumps for the wells are shown in figure 16. The hot water and steam form the earth are used as an energy source. This system is reported to be 30% more efficient than conventional systems (LDS Church).

Figure 15. LDS Church Office Building, Salt Lake City, UT. (LDS Church, 2010)

Figure 16. Geothermal pumps under LDS Church Office Building. (LDS Church, 2010)

Another great advantage in energy efficient design is planning in relation to climate. Bioclimatic design means something is of or concerned with the relations of climate and living organisms. Bioclimatic architecture and design uses climate and environmental conditions to maximize the desired interior thermal comfort. This includes considerations of sun exposure, aspect, shade canopy, yearly weather patterns, and daily micro-climate effects (Olgay, 1963). This remains under utilized by the LDS Church as well although the eco-physical, social, and economical advantages are clear.

In a technological age of communication advancement, the need for travel is reduced to facilitate business ventures and meetings. The LDS Church has been broadcasting meetings since the 1980's saving an estimated 100,000 gallons of fuel per meeting (LDS Church, 2010). Reducing emissions improves air quality for everyone.

Energy efficient indoor fixtures are a source of energy conservations as well. The motion sensor in figure 18 is used through LDS Church meeting houses. It recognizes movement to turn lights on and then off, so at times of no activity no excessive energy is used. Energy efficient light bulbs and other appliances are helpful as well.

Photo cell daylight sensors are attached to the exterior of buildings to turn on and off outdoor lighting. Lighting during daylight hours can be avoided, thus saving energy.

Low flush toilets and low flow faucets are amenities that reduce indoor water use. Savings overtime offset the upfront cost are incurred.

Money is saved by implementing these features and eco-physical benefits are immediate.

Figure 17. Satellite for broadcasting. (LDS Church, 2010)

Figure 18. Motion sensor. (LDS Church, 2010)

Figure 19. High efficiency lighting. (LDS Church, 2010)

Figure 20. Photo cell daylight sensors. (LDS Church, 2010)

Figure 21. Low flush toilet. (LDS Church, 2010)

Figure 22.
Solar powered meeting house in Farmington, UT. (LDS Church, 2010)

Figure 23. Information kiosk in meeting house. (LDS Church, 2010)

Figure 24. Efficient building insulation in meeting house. (LDS Church, 2010)

The meeting house above is part of a pilot program of the LDS Church in completely solar powered buildings. Solar power from solar panels attached to the roof generate electricity that is converted and used onsite. This is another form of renewable energy. In addition to soalr panels, this meeting house educates visitors on energy usage in the building at the kiok shown in figure 23. Other features such as effective building insulation help it maintain a comfotable temperature without excessive energy use (LDS Church).

Low water landscaping is more water efficient. Bike racks and adequate sidewalks encourage alternative nethods of transportation like walking and biking. Four other buildings in the intermountain west are being closely monitored for economic saving feasibility for possible widespread future use.

The 2012 City Creek Center mixed-use development in downtown Salt Lake City, UT is a prime example of sustainability. When discussing the economic dimension of sustainability there are cost saving practices, but there are also planning design techniques that can stimulate the economy and encourage buying. The center covers two city blocks and was planned in coordination with the success of downtown Salt Lake City. Retail and shopping are very accessible while apartments and condos occupy upper building levels. Restaurants and food courts allow guests to stay long periods. Water features attract people of all ages. The retracting glass roof protects visitors in inclement weather. Ample seating and gathering spaces have been incorporated.

City Creek Center has earned LEED Silver and LEED ND, Neighborhood Development. Sustainable principles have been applied in design, construction and operation. For example, more than 50% of demolition debris has been recycled. City Creek Center was a LEED ND pilot project. It is one of 60 pilot projects in the country selected to participate in a focus group that is helping the U.S. Green Building Council finalize its new LEED ND certification process (Salt Lake Chamber, 2012).

Figure 25. City Creek Center, Salt Lake City, UT. (Cameron, 2012)

Setting Things Straight

"The only denomination that has formally stated its opposition to ecology as part of the church's mission is the Church of Jesus Christ of Latter Day Saints" (Handley, 2001). This statement from Max Oelschlager, professor of philosophy and religions studies, is an indication of the lack of understanding of LDS Church beliefs and practices related to the natural world.

A professor at the LDS Church owned Brigham Young University, George Handley, has researched LDS Church earth stewardship and provided the following commentary on this subject. "The time has come to find common ground between environmentalism and Mormon belief. The perceived divide between the two has all but shut down the possibility of dialogue. Some Mormons dismiss the political causes of environmentalists as being the fear of faithless hedonists, just as otherwise responsible environmental scholars and activists sometimes perpetuate myths and inaccuracies about what they perceive to be the anti-ecological stance of the Church of Jesus Christ of Latter Day Saints" (Handley, 2001). This research paper is an effort to close this "divide" in illustrating LDS Church environmental stewardship practices.

LDS Church in Earth Stewardship in Building & Design

"We work to be good stewards of the environment wherever we build and manage properties," explained Donald J. Hein, an architect in the Church's Physical Facilities department (Newsroom, 2010). This is an expansive undertaking considering the church has buildings operating in almost every country and builds around 200 new meeting

houses annually. This very clear statement is also a claim to employ sustainable practices world-wide, as was illustrated in this paper.

Jared Doxey, Director of Architecture, Engineering & Construction in the LDS Church Physical Facilities department, explained that being good stewards to the environment is aided worldwide by teams of locally-based professionals. “Every area of the Church has an architect that understands the building codes in their communities and responds to the needs of the local cultures. We share our best practices from one area to another; there’s lots of collaboration on the technical side of the Church construction processes” (Newsroom, 2010). This shows understanding that unique environmental, social, and economic issues are faced at every location. An effort to mitigate them through use of local designers is a step in becoming better earth stewards.

In addition to decades of work in seeking and implementing practices of environmental stewardship, the LDS Church is leading a pilot program of five “green buildings” in the intermountain region (Newsroom, 2010). These buildings are solar powered and incorporate other energy and water efficient measures in the building and landscape. This represents the LDS Church’s efforts over the past decade to build and design sustainably. Bishop Burton commented on the project saying, “This is another step in our program to be environmentally responsible” (Newsroom, 2010).

Bishop Burton made another remarkable statement in 2010 saying, “There is something very doctrinally sound when we talk about conservation of resources, when we talk about being responsible. Not only responsible in the environment, but responsible for our own lives and how we live them and the direction our lives take. Those kinds of things are very important in terms of our individual members.

"Like parents, we have teaching moments. We can say this is a teaching moment. Not only are we trying to do it institutionally, we hope that our members will use responsible, conservative kinds of activities as they conduct their own personal lives" (Hill, 2010).

This statement begins by calling out doctrinal significance of "conservation of resources" (Hill, 2010) which is part of the belief system governing the LDS Church. Next, Burton indicates that this belief is being incorporated into the structure of LDS Church building activities. Finally, he makes clear the hope that members and constituents allow these beliefs to govern their individual choices as well. The goals and intentions of the LDS Church are clear. Earth stewardship is becoming a priority.

Relevance to the Field of Landscape Architecture

Professionals in the field of Landscape Architecture and Environmental Planning design the built environment. This influences people's relationship with and attitudes towards the natural world. Landscape Architects design outdoor spaces from small parks and streetscapes to large communities and regional recreation master plans. Design can work with and protect the environment while making it accessible to all people. The built environment is a place where the three pillars of sustainability comprising social equity, environmental bear-ability, and economic viability are clearly manifested. The commitment of Landscape Architects to sustainable design is integral in transitioning our infrastructure into a renewable self-sustaining system.

Understanding the religious and cultural influences on communities helps Landscape Architects to design successfully. 58% of Utah Citizens age 18 and over self-

identify their religious affiliation as with the Church of Jesus Christ of Latter Day Saints headquartered in Salt Lake City (U.S. Religious Landscape Survey 2008). The findings of this research will allow Landscape Architects to become more marketable to Utah and other LDS clients as they better understand the design practices of the dominant LDS Church.

In addition to marketability (and more importantly), there are ethical priorities to understanding sustainable design. Since the profession of landscape architecture was so named in 1867, dedication to the principles of public health, safety, and welfare and recognition and protection of the land and its resources has been central (ASLA, 2011). These principles form the foundation of the American Society of Landscape Architects Code of Professional Ethics as well (ASLA, 2011).

The study of landscape architecture involves the understanding of ecological and social systems so they can be adequately design for. As knowledge is gained about the sensitive systems around us upon which we heavily rely, responsibility grows. Landscape architects have the responsibility and moral obligation to plan and design in respect to and acknowledgement of these systems.

Conclusion

The practice of Sustainability in building and design is best described in terms of energy conservation; water conservation; sensitivity in construction practices and reuse of existing building material; use of native or climate-sensitive vegetation; design promoting multiple uses and appropriate densities, design enhancing social contact, health, safety, comfort, and accessibility of users; design enhancing alternative transportation, biking, or walking; cost effective design with payout for sustainable upgrades during life-expectancy of building/site.

As illustrated, the LDS Church through their efforts to be “good stewards” closely follows modern trends of sustainability in building and design. As new buildings and sites are designed with green-industry standard elements, the visibility of the LDS Church as a proponent for earth-stewardship and sustainability will grow. It is assumed that renovating the thousands of existing buildings and sites without these features operated by the LDS Church world-wide for the sole purpose of implementing more environmentally sensitive feature is not cost effective, limiting the viability of sustainable practices to new projects.

This research, however, does not prove that earth stewardship efforts are motivated solely out of concern for the environment. Cost effective design could be the sole driver of building principles that happen to coincide with sustainable practices. Although instances of sustainable design principles are and have been used over previous generations they are not the majority of cases as represented by available data.

Further Research

Now that best practices in sustainable building and design have been established, the next step is to create and implement a way to measure the effectiveness of these practices in conserving environmental resources, supporting social equity, and promoting economic viability. The current solar-powered meeting house pilot program is a good effort in doing this, although the extent of measurement is not publically known.

Because meeting houses are the predominant form of site and building that the LDS Church generates, general categories could be created for areas of high resource use, environmental impact, and site integration. Criteria could then be developed for practices that indicate earth stewardship and resource conservation, social equity, economic viability within applicable categories. By measuring and comparing data, trends would emerge and the most effective practices as well as areas in need of improvement would become evident. Short and long term cost savings could be calculated driving the economic motivation to implement sustainable features on a broader scale.

In the field of sustainable landscape architecture and building design in predominantly LDS communities, other interesting research would evaluate the effect of the LDS Church's goals and actions showing earth stewardship on its member's sustainable attitudes and behavior. Recognizing this could create momentum for implementation of sustainable elements in the built environment, or, expose opportunities for better community education of the economic, social, health, and ecological benefits of sustainable design.

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