# **RSC 5050 Part 1 Excerpt from Theories of Sustainability and Resilience on Maui:** A Multi-Scalar Approach to Goal Setting in an Independent School

## **Historical Background**

Looking across temporal and spatial scales, it is beneficial to offer a brief study on the underpinnings of sustainability in Hawaiian culture prior to western contact. By pairing the traditional pre-contact Hawaiian worldviews with the current theories of sustainability and resilience, we can better envision the necessary paradigm shift that will be required to achieve a sustainable and resilient society for future generations. The following brief exploration of pre-contact Hawaiian culture highlights important attributes of sustainability and resilience that should be considered when setting goals for any community.

Generations of reciprocal relationships between communities and nature, coupled with an intimate ecological and environmental knowledge supported the initial sustainability and resilience of pre-contact Hawaiian society. During this time period, Hawaiian concepts of sustainability were based upon three pillars, 1) an island worldview, 2) a sense of connection to the land, and 3) communal interdependence (Fisher, 2015). Fisher stated "the 'island worldview' stands in contrast to the western worldview in its understanding of the inherent [resource] limitations of island ecosystems" (p. 8). Through careful observation and an oral tradition of passing down critical knowledge and practices to subsequent generations, an intimate understanding of ecological and environmental processes ensured the success of early Hawaiian communities. The establishment of *kapu*, or laws (literally meaning sacred), subsequently expressed this knowledge that protected natural resources from overexploitation, which would otherwise cause harm to a Hawaiian society that existed on subsistence farming and fishing practices.

In ancient Hawaiian culture, *wai*, or water, was considered sacred and their practice of equally sharing water gave them their word for law, *kānāwai*, and their word for wealth, *waiwai* (Williams, 1997). "In any given resource district, water represented the primary resource limitation" (Fisher, 2015, p.13). As such, the Hawaiians ensured that any water that was diverted for subsistence practices remained within the *ahupua* 'a, (the most basic unit of land division in pre-contact Hawai'i), and was returned to the stream or ocean after it passed through their systems.

Traditional Hawaiian *kānāwai*, or law, originated and developed around the use of *wai* (Sproat, 2009). They viewed *wai* as part of the commons and without ownership; its rights of use were allocated or revoked by the King through his chiefs, the *ali'i*, and their agents, the *konohiki*, "who endeavored to secure equality of division and to avoid troublesome quarrels between the tenants [*maka'āinana*]" (Wilcox, 1996). In this way, early Hawaiian society enacted social controls to protect the health and utility of the watersheds that were critical to their subsistence economy and very survival.

Consequently, the Hawaiian community viewed equitable water distribution from a holistic perspective. Not only did the life that is supported by and dependent upon water have rights to it, but also the water itself, through its intrinsic value, was deserving of moral considerability.

Hawaiians embraced the intimate connections between themselves and the surrounding environment. They believed the environing life forms to be alive with consciousness and viewed them as *kino lau*, or manifestations, of the principal gods Kane, Kanaloa, Ku, and Lono (Callicott, 1994, p. 111). This sacred relationship with the natural world prompted the Hawaiians to practice *aloha 'āina*, or love for the land, and to consider themselves *kama 'āina*, or children of the land, that upheld an intrinsic valuation of the native ecosystems.

In early Hawaiian culture, the integration of nature and society created a holistic system that was valued for more than just the sum of its parts. Communal interdependence in pre-contact Hawaiian society "fostered a sense of reliance on one's community, as well as the bounty of the natural environment from which all life ultimately derived" (Fisher, 2015, p. 11). The *ahupua* '*a*, which supported the well being of the people, was an important expression of this community interdependence. Each '*ohana*, or extended family, had access to the resources that were available within their *ahupua* '*a*, which stretched from *mauka* (mountain) to *makai* (ocean). Work to improve the land for the common good within the *ahupua* '*a*, such as *auwai* (irrigation ditches), *lo* '*i* (wet taro plots), and *loko i* '*a* (fishponds) was completed in the spirit of cooperative enterprise, or *laulima* (many hands) (Handy et al., 1991).

The success of irrigation and subsistence practices and stratified hierarchical system of governing led to a rapid population expansion from 40,000 people in 1200 AD to a peak of over 200,000 in 1500 AD (Grigg, 2012). It is generally accepted that the first human colonizers arrived in Hawai'i from the Marquesas Archipelago, some 4,000 km to the southeast, between 300-500 AD. Cuddihy & Stone (1990) suggested that the original population may have been as few as 100 people and the initial impact on the environment was small at first, but after about 1200 AD with the arrival of the Tahitians, the population increased dramatically and doubled every century thereafter.

As the population increased, so too did the impacts to the islands' ecosystems; "deforestation and erosion were the natural results of Hawaiian agriculture" (Cuddihy & Stone, 1990, p. 25). The destruction of the lowland native forests for agricultural production and the resultant filling in of estuarine lagoons with eroded sediment were all but complete by 1650 AD, and resulted in an overall population decline due to a reduction in the land's carrying capacity (Culliney, 2006; Cuddihy & Stone).

Subsistence agriculture in the first few decades following Western contact in 1778 gave way to commercial harvesting of resources for trade. The export of goods such as

sandalwood, *pulu* (pillow and mattress stuffing), firewood, endemic *olonā* for ship's cordage, and agricultural provisioning of whaling and trading vessels with pigs, bananas, taro, and sweet potatoes dominated the early to mid 19<sup>th</sup> century (Cuddihy & Stone, 1990). "Beginning in the 1850's, modern agriculture, ranching, and varied forest management practices, [...] brought rapid and large-scale land use changes to Hawai'i" (Cuddihy & Stone, p.41). The transformation from an island worldview to a western worldview, which "fostered notions of individuality and the limitless availability of resources for human consumption" was complete (Fisher, 2015, p.17).

The 20th and 21st centuries saw a rise of mixed-use development on the isthmus of the Central Valley in support of the growing sugarcane, pineapple, and tourism industries. Culliney (2006) stated "Major threats come from an invasive community of international private enterprise, exemplified by large resource extractors and land developers, in affiliation with certain agencies of federal, state, and county governments" (p. 343). Residential, retail, and industrial areas have sprawled across Maui's best arable soils, and the recent end to the sugarcane industry has many of us wondering if Maui's future is destined to rival Oahu in development density and environmental degradation.

The previous case study of pre-contact Hawaiian was introduced not to suggest that we return to a subsistence form of society in whole, but rather, to illuminate those attributes that made early Hawaiian society sustainable and resilient. Of equal importance, lessons can also be gleaned from the disturbances and thresholds that negatively impacted their continuation as a society. Moving forward, Hawai'i must attempt to straddle two opposing conceptual frameworks on their path towards sustainability and resilience.

The western worldview is rooted in Judeo-Christian tradition that evolved from the creation myth found in Genesis 1:26-28. Callicott (1994) suggested that three interpretations, with respect towards the Judeo-Christian environmental worldview, resulted from a careful analysis of the Bible. The first, the despotic interpretation, argues that since man was given dominion over the Earth, God intended that "man be master and nature slave" (Callicott, p. 15). The second, the stewardship interpretation, argues that because man was created in the image of God, along with those privileges came the responsibilities that "man must wisely and benignly rule his dominion" (Callicott, p. 16). The third interpretation, the citizenship interpretation, argues that anthropocentrism is, in fact, the original sin. With this sin came the knowledge of good and evil and man was then able to "size up the rest of creation as it pertained to himself" (Callicott, p. 19). In other words, the flora and fauna that were useful to him, man deemed "good" and those that were troublesome or dangerous were called "evil." Regardless of the individual interpretation, a common thread binds them together: the idea of man, along with God, as separate from nature. White (1967) stated, "Christianity is the most anthropocentric religion the world has ever seen [...] Man shares, in great measure, God's transcendence of nature" (p. 1205).

In direct contrast, the "island worldview," as identified by Fisher (2012), celebrated precontact Hawaiian society's genealogical connection to nature and the gods through the *Kumulipo*, a Hawaiian Creation Chant. The chant began in the night at the beginning of time and scrolled through geological, plant, and animal succession to arrive at their societal climax, the Hawaiian royal family. The *Kumulipo*, in part, reflects their cultural knowledge of species creation across the ages or  $w\bar{a}$  and highlights the kinship felt between traditional society and the natural environment. Merchant (2005) argued that these types of cultural belief systems "guide group behavior towards nature... [and] operate as ethical restraints or ethical sanctions - as subtle 'oughts' or 'ought-nots" (p. 43). No such cultural restrictions on natural resources exist in the Western worldview. A fundamental understanding of regional divergent worldviews is helpful in that it provides us with a common framework from which we may begin to explore theories of modern sustainability and resilience in the Hawaiian Archipelago.

### **Introduction to Sustainability Theory**

For our purposes, sustainability is defined as equitably meeting the basic socioeconomic and environmental needs of present-day cultures without degrading existing natural systems or compromising the ability of future generations to meet their own changing needs. This definition of sustainability, which is based on the Brundtland definition, focuses on meeting the present and future needs of people and of natural systems; two interrelated yet often-conflicting systems.

A Chilean economist, Manfred Max-Neef proposed a model of "Human Scale Development," which understands that "all human needs are interrelated and interactive" (Max-Neef, 1991, p.199). He further defined his system of Human Scale Development as:

Focused and based on the satisfaction of fundamental human needs, on the generation of growing levels of self-reliance, and on the construction of organic articulations of people with nature and technology, of global processes with local activity, of the personal with the social, of planning with autonomy, and of civil society with the state. (p. 8)

The Human Scale Development system is a taxonomy of human fundamental needs defined by subsistence, protection, affection, understanding, participation, leisure, creation, identity, and freedom. In addition, Max-Neef explored these needs further by including the existential categories of being, having, doing, and interacting. The result is a matrix (fig 1) that uses 'satisfiers' to describe the ways in which these needs are met.

	Need	Being (qualities)	Having (things)	Doing (actions)	Interacting (settings)	
1	subsistence	physical and mental health	food, shelter, work	feed, clothe, rest, work	living environment, social setting	
2	protection	care, adaptability, autonomy	social security, health systems, work	co-operate, plan, take care of, help	social environment, dwelling	
3	affection	respect, sense of humour, generosity, sensuality	friendships, family, relationships with nature	share, take care of, make love, express emotions	privacy, intimate spaces of togetherness	
4	understanding	critical capacity, curiosity, intuition	literature, teachers, policies, educational	analyse, study, meditate, investigate,	schools, families, universities, communities,	
5	participation	receptiveness, dedication, sense of humour	responsibilities, duties, work, rights	cooperate, dissent, express opinions	associations, parties, churches, neighbourhoods	
6	leisure	imagination, tranquility, spontaneity	games, parties, peace of mind	day-dream, remember, relax, have fun	landscapes, intimate spaces, places to be alone	
7	creation	imagination, boldness, inventiveness, curiosity	abilities, skills, work, techniques	invent, build, design, work, compose, interpret	spaces for expression, workshops, audiences	
8	identity	sense of belonging, self- esteem, consistency	language, religions, work, customs, values, norms	get to know oneself, grow, commit oneself	w, places one belongs to, everyday settings	
9	Freedom	autonomy, passion, self- esteem, open- mindedness	equal rights	dissent, choose, run risks, develop awareness	anywhere	

Max-Neef's model is anthropocentric in nature and, as such, focuses solely on the needs of people. The insights it provides are critical to informing our definition of socioeconomic sustainability, however, they lack due consideration of the ecocentric perspective and value nature instrumentally in as far as it meets our own needs. What is necessary is an intrinsic valuation of nature, "that treats all life as indispensable" (Jamieson, 1998, p. 191). Furthermore, Jamieson argued for "a richer set of positive visions regarding the proper human relationship to nature" (p. 191). Therefore, a holistic approach to sustainability must include the needs of non-humans and the environment. To some extent, the pre-contact Hawaiian "island worldview" comes close to achieving this high standard.

Jolibert et al. (2011) understood this and extended Max-Neef's Human Scale Development model to include all of the human and non-human stakeholder needs. She stated "the excessive value attached to human rights and needs hampers a good understanding of our place and our role in the structure and functioning of the rich and complex fabric of the natural world" (p. 260). Jolibert et al. applied Max-Neef's needs and satisfiers to each of the stakeholders involved in their study of resource managers, fish farmers, and otters. In the case of the non-human participants, biologists with a thorough knowledge of otter behavior provided the necessary satisfiers; fish farmers and resource managers supplied their own perspectives. This strategy identified their individual poverties and interdependencies in an effort to resolve the resource conflict between them. The study demonstrated an approach "to rebuild organic interactions between the personal and the social, between global processes and local activity, between planning and autonomy, and between civil society and the state" (Jolibert et al., p. 267). The defense of satisfiers, both human and non-human, are shown in this study to enable change in human-centered organization and behavior and serves to move our definition of sustainability closer to an intrinsic valuation of non-human actors and a middle path towards sustainability. Davies (2013) argued "by analyzing the differences, commonalities can be drawn out, which facilitates the discovery of a middle pathway" (p. 111).

This 'middle pathway,' as proposed by Davies (2013) suggested a middle ground approach to resolving sustainability discourse between those who follow a 'strong sustainability paradigm,' which is characterized by an entirely ecocentric approach, and those who follow a 'weak sustainability paradigm,' which is indicative of an anthropocentric approach. Although our definition is based upon the Brundtland definition of sustainability, which is considered 'weak sustainability,' we have added an ecological component, "without degrading existing natural systems" to it that effectively carries it into Davies' 'middle pathway.'

However, simply adding this environmental value to our definition does not illustrate the compromises that must result as a consequence of its addition. In gauging an acceptable level of compromise, we must consider how interchangeable the notions of natural, manmade, and human capital are (if at all). From the perspective of 'weak sustainability,' man-made capital (factories, machinery, and roads) is more important than natural capital (resources, plants, and ecosystems), while 'strong sustainability' argues that there can be no substitute for natural capital (Davies). So if our definition lies somewhere along the middle pathway, where do we draw the line for their interchangeability? These dichotomies must be broken down by analyzing the differences "in an effort to pull the two ends of the spectrum closer together so that the can meet on common ground" (Davies, p. 119). Davies argued for a minimum requirement of sustainability is only achievable if these two minimum requirements are met (p. 118).

Max-Neef (1991) suggested that human needs themselves are few and finite and that they are constant through all cultures and generations; what actually changes between generations and cultures is the way in which these needs are satisfied. However, with respect to sustainability Wolf (2007) argued that we in the present are responsible for a future generation's ability to meet their basic needs because they are "vulnerable to our

choices, and that it is typically regarded as 'unjust' when some people needlessly deprive others of the ability to meet basic needs" (p. 24).

This view of intergenerational saving of resources is foundational to our definition of sustainability.

# **Introduction to Resilience Theory**

Resilience is defined as "the capacity of a system to absorb disturbance and reorganize so as to retain essentially the same function, structure and feedbacks-to have the same identity" (Walker & Salt, 2012, p. 2). Most of the time, systems can adapt to changes brought on by disturbances. However, sometimes they cannot and undesirable effects arise that can lead to the transformation of the system at higher scales of influence. When this happens, Walker & Salt claimed that a system has surpassed a threshold and crossed into another regime; it now behaves in a different way, and sometimes that comes with huge consequences.

Resilience occurs at a variety of linked scales and across multiple domains. In terms of assessing resilience, Walker & Salt (2012) argued "it is critical to acknowledge that you can't understand the focal scale (the thing that you're interested in) without appreciating the influence from the scales above and below—and often beyond that to larger and finer scales" (p. 15). Additionally, these scales are interlinked between social, economic, and biophysical domains where changes in one domain often lead to changes in another domain, which then feed back into the first domain to cause an additional disturbance within the system (Walker & Salt). Tables 1, 2, and 3 generally illustrate the systems in play across a regional set of scales.

neral	TABLE 2 - General		TABLE 3 - General		
tems	<b>Operating Systems</b>		<b>Operating Systems</b>		
Micro Scale - MOMI		Meso Scale - Island		Macro Scale - Region	
Governance		County	Governance	State & Federal	
		Agencies		Agencies	
Financial		Policy Makers		Policy Makers	
Admissions	Governance	Licensing Organizations		Licensing Organizations	
Development		Community Planning		Regional Drivers of Growth	
HR			Economy	Grant Makers Lending	
Support		of Growth		Institutions	
Committees	Economy	Grant Makers	Services Infrastructure	Education	
Programs		Institutions		Military	
Support		Education		PDC	
Utilities	Services	Support		Biosecurity	
Information Technologies (IT)		Health & Safety		Shipping	
Built Environment		Utilities		Built Environment	
Maintenance Waste		Shipping Waste		Food Security Waste	
Management		Management		Management	
Janitorial	Infrastructure	Built Environment		Habitat	
Habitat		Housing	Environment	Wildlife	
Wildlife		Transportation		Weather Events	
Weather		Transportation		Changing	
Events		Food Security		Climate	
Changing		·····		Resource	
Climate		Habitat		Management	
Carbon Footprint		Wildlife		Carbon Footprint	
	neral tems MOMI Governance Financial Admissions Development HR Support Committees Programs Support Utilities Information Fechnologies IT) Built Environment Maintenance Waste Management Janitorial Habitat Wildlife Weather Events Changing Climate Carbon Footprint	neral temsTABLE 2 - G Operating Sy Meso Scale -GovernanceGovernanceFinancialGovernanceAdmissionsGovernanceDevelopmentEconomyHREconomySupportServicesCommitteesServicesInformationFechnologiesInformationInfrastructureWasteInfrastructureWanagementInfrastructureWildlifeFootprint	neral temsTABLE 2 - General Operating SystemsMOMIMeso Scale - IslandGovernanceCounty AgenciesFinancialPolicy Makers Licensing OrganizationsAdmissionsGovernancePolicy Makers Licensing OrganizationsDevelopmentCommunity Planning Land Use ZoningCommunity Planning Land Use ZoningDevelopmentEconomyGrant Makers Lending InstitutionsSupportEconomyGrant Makers Lending InstitutionsSupportServicesEducation Community SupportUtilitiesServicesSupport Health & SafetyJuitInfrastructure HabitatShipping Waste Management Built EnvironmentWildlifeInfrastructure Food SecurityTransportation WildlifeWildlifeWildlifeWildlife	neral temsTABLE 2 - General Operating SystemsTABLE 3 - G Operating SystemsGovernanceMeso Scale - IslandMacro ScaleGovernanceCounty AgenciesGovernanceFinancialPolicy Makers Licensing OrganizationsGovernanceDevelopmentCommunity Planning Land UseEconomyGrant Makers Lending InstitutionsEconomySupportEconomyGrant Makers Lending InstitutionsEconomySupportEconomyGrant Makers Lending InstitutionsFelucation CommunityUtilities nformation fechnologiesServicesSupportSupportServicesSupportInfrastructure ManagementMaintenance Waste ManagementManagement HabitatInfrastructure HabitatWildlife ComprintFood Security WildlifeEnvironment Habitat	

Changing Climate Conservation Furthermore, interconnected systems, across different scales and domains, often vary in terms of where they are in their adaptive cycles. Walker & Salt (2012) argued that a system is either operating within a fore loop of a cycle, which is identified by growth and development, or a back loop, which is identified by release and reorganization. They further characterized the fore loop by "stability, relative predictability, and conservation," which enables the accumulation of natural, human, and economic capital. "The back loop, by contrast, is characterized by uncertainty, novelty, and experimentation. It's the time of greatest potential for the initiation of either destructive or creative change in the system" (Walker & Salt, p. 13). It is this hierarchy of linked cycles across different scales "that governs the behavior of the whole system" (p. 17).

Resilience in any given system or set of systems can be identified by two complementary aspects, specified and general (Walker & Salt, 2012). Specified resilience is defined by Walker & Salt as the resilience of a system to a specific disturbance, while general resilience "is the capacity of a system that allows it to absorb disturbances of all kinds, including novel, unforeseen ones, so that all parts of the system keep functioning as they have in the past" (p. 17). Both aspects of resilience must be considered, because focusing your efforts on one or the other will potentially erode resilience in other ways (Walker & Salt).

Resilience theory and sustainability theory are complementary in that neither plays a subordinate role to the other, but rather, they aim towards different types of goals; resilience looks towards absorbing shocks, while sustainability focuses on developing an important system property (Throop, 2019). It is up to us to determine which is more important for a particular time and place.

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