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## Consideration of the Human Dimensions in Socio-Ecological Systems

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## Consideration of the Human Dimensions in Socio-Ecological Systems

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### **Abstract:**

The cause of most of our environmental or ecosystem problems are humanly constructed, rooted in the culture and structure of our decision making. Western cultures evolved from mental models of humans being exogenous and able to control our natural environment. This historic view has been challenged by post normal science that views socio-ecological system SES problems as complex, interdisciplinary, with uncertain facts, disputed values, high stakes and the need for urgent decisions. Poor performance or system failure is often the result of limited human and humanly constructed institutions to fully understand and holistically manage dynamic and complex functionally linked systems that produce their own patterns of behavior. Human constructs often succumb to the archetypical system failures or traps described by Donella Meadows. The resilience of an SES program requires the actors who are inextricably functionally linked to the system design and any policy that is derived from it to possess the capacities to transcend many innate or ingrained socio-psychological approaches to complex SES problems. Therefore, SES models that do not adequately account for the human dimension and human roles within the SES are not sufficiently holistic to overcome archetypal system failures. Most human dimension SES research is theoretical rather than empirical or focuses on the human impact on the environment – not the human capacities necessary to avoid system failures. Our initial work developed a diagnostic tool that tested 70 literature based competencies. The tool was tested to determine its ability to capture perceived characteristics of decisions that align with systems thinking, and participatory and network based problem management. The study population were practitioners associated with Michigan's environmental contamination cleanup and redevelopment program. The results of this research indicate that the exploratory tool was reliable and valid. Longitudinal data of key competencies showed increased ratings by panel members correlating with field validated outcomes – significant increases in environmental risk reduction at contaminated sites. The respondent and the field reported data aligns with the diagnostic tool's premise that with improved decision quality, SES outcomes should improve. We continue to delve deeper into the development and testing of socio-psychological diagnostic parameters and system thinking assessment tools to support improved SES system modeling analysis, discourse, deliberation and SES implementation. Understanding and incorporating the human dimensions and their limitations within a SES system should improve the functionality among the actors, system modelers and decision makers – avoiding archetypical traps.

**Keywords:** SES frameworks; systems thinking; human dimensions of SES; SES governance.