

The Human Dimensions of Sustainable Fisheries Management

Understanding the Importance of Social Impact Assessment in the Development of Limited Access Privilege Programs in Fisheries Management

by

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ABSTRACT

The intersection of human social systems and fisheries management is a highly complex web of interwoven relationships. The communities that rely on commercial fisheries for social, cultural, and economic support are experiencing increased pressures on their survival as a result of global fisheries decline. While the effects of these pressures have had obvious economic and biological impacts, they have also had profound social effects that are rarely captured or addressed. Government agencies and NGO's largely responsible for creating fisheries management plans are often not equipped to measure these social costs.

The purpose of this paper is to formulate a social assessment framework for capturing potential changes in the social capital of fishing communities under a limited access privilege program (LAPP). Thorough investigation of the North Carolina snapper-grouper complex and the Mexican Kino Bay fishery were the catalyst for adaptation of the institutional analysis and development (IAD) framework presented as a new metric for understanding social transformations in these communities. On a broader level, this paper aims to encourage social science involvement in fisheries management in order to promote a balance between the social and biological components of fisheries management.

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Introduction

The intersection of human social systems and fisheries management is a highly complex web of interwoven relationships. These social ecological systems penetrate the core of human and environmental interactions. Understanding the interdependency between these two systems especially in regards to the social implications on fishing communities, has remained largely ignored. Much of the research and emphasis in fisheries management has focused on the biological aspects of fisheries science. Commercial fisheries and the communities that rely on them for social, cultural, and economic support are undergoing increased pressures on their survival as a result of global fisheries decline and economic hardship. While the effects of these pressures have had obvious economic and biological impacts, they have also had profound social affects that are difficult to assess let alone calculate. These impacts are rarely captured nor are they commonly addressed.

Objective

The purpose of this paper is to create a theoretical framework for assessing social impacts on fishing communities imposed by federal and state fishery management plans, specifically limited access privilege programs (LAPP) or “catch shares” system. Using an Institutional Analysis and Development (IAD) framework, this analysis aims to combine common-pool resource theory and principles of complex social ecological systems to adapt a metric for measuring social capital on a community level. This specific study aims to investigate the potential social effects of a LAPP system on the North Carolina snapper-grouper complex using the proposed framework. This case study will also serve to illustrate the complexity of

embedded social ecological systems and thus point to the necessary inclusion of social impact assessments in all fisheries management plans, specifically for fisheries managers within governmental (federal and state) agencies and non-governmental organizations (NGO's). On a broader level, this paper aims to emphasize the need for an increased social science role in fisheries management and to ultimately redefine the future of fisheries management by promoting a balance between the social and biological disciplines.

The past half century has seen an increased rate of change in historic fishing communities that include mass migrations of younger generations away from fishing communities and the increase of leisure tourism to coastal areas. In many cases, these communities are disappearing all together under various internal and external pressures. Once prosperous cultural centers with rich histories and strong social values systems, these communities are now facing harsh economic realities in the midst of countless social ills. As a result, strong social infrastructures are shifting, and in some cases buckling under the tremendous economic and social pressures. Uncovering how these communities are transforming and identifying the institutional processes driving the increased rates of change can serve to better inform policy makers and managers in making socially conscious management plans.

Exploitation of the Global Fisheries

In 2008 the Food and Agriculture Organization (FAO) released a report addressing the state of global fisheries entitled *The Sunken Billions*. According to the report poverty levels within fishing communities were on the rise as a direct result of slumping employment in the commercial fishing sector across the globe. Today, nearly two years after the report was first

released, employment in the commercial fishing sector as well as fishing related jobs (processing, boat maintenance etc.) has continued to decline. Technological advances in fishing finding equipment and gear have also increased this statistic. One of the most of evident reasons for this marked decline is the fact that commercial fisheries are operating at near or over capacity; a reality that has occurred for decades. Essentially, humans have become too skilled at landing fish. The excessive number of operational fishing boats combined with current technological advances in gear has far surpassed the amount of fish remaining in the global oceans.

Advancements in fishing technologies have meant additional investment costs for small scale commercial fishermen. These fishermen are pressured into investing large sums of money for state-of-the-art fish finding technologies. In fact, in many fishing communities these investments have lead to an increase in risky loans and overall revenue leakage as a result. In some cases it is not uncommon for fisheries dependent families to mortgage their homes multiple times in order to keep up with expensive technological advancements (West and Garrity-Blake 2003). Further costs are accrued when new regulations force gear changes aimed at leveling the playing field. Similarly, increased investments in labor saving equipment have further diminished already shrinking employment opportunities in the commercial fishing sector.

Fueled by first world nations' insatiable appetite for seafood, this unfortunate situation has not only exacerbated the already dangerously overfished global fish stocks but it has also led to dangerous conditions for commercial fishers. With more at stake with each trip to sea, fishers are forced to risk life and limb to secure their livelihoods on the few remaining fish.

Derby fishing caused by the “race to fish” not only promotes these unsafe fishing practices but it also creates damaging market gluts resulting from a sudden inundation of the market at the beginning of each fishing season (“Sustaining America’s Fisheries and Fishing Communities”).

At its core, the goals of this investigation include analyzing the potential impacts resulting from changes in rules, environmental conditions, or community attributes. And more specifically, this investigation aims to understand the likely response of “reformed structure on incentives, strategies, and outcomes” resulting from implementation of a LAPP (Ostrom 1999).

Limited Access Privilege Programs

An Individual Fishing Quota (IFQ) or LAPP is method for fisheries management that has recently gained momentum although it has been in existence since the 1970’s (“Sustaining America’s Fisheries and Fishing Communities”). Other commonly associated terms for these programs include Individual Tradable Quota (ITQ) systems or more simply “catch share” systems. All of these terms are loosely related through their association to an economically based quota approach to fisheries management. This scheme applies a quota system driven by market-based incentives to motivate more sustainable and economically advantageous fishing practices.

The benefits of catch shares system include increased levels of accountability amongst fishers, safer fishing practices, and continued job security. Because fishers will no longer need to compete against one another for catch, they can stop dangerous “derby fishing” as there will no longer be a race to fish. These conditions also result in a reduction of market gluts precipitating from an inundation of landings at the beginning of each fishing season (Sustaining America’s Fisheries and Fishing Communities”). Biologically, catch shares indicate an end to

overfishing and in most cases fish stock recovery. Also, because fishers no longer need to throw back accidental catch that is not in season, catch share systems see vast reductions in bycatch.

Additionally, catch shares system can address redundancies in regulations as well as over capitalization in the current system. By streamlining the management system, other aspects of fisheries systems can reap benefits. In reducing bycatch, health of the overall marine ecosystems experience less destructive fishing practices and resource depletions (“Sustaining America’s Fisheries and Fishing Communities”). Catch share systems also force communities to define their fishing grounds (spatially, culturally, or by fishing gear or species), a formidable step towards building a sense of community. Lastly, a catch shares system addresses issues of monitoring and enforcement by promoting trust and reciprocity. As an increase in community participation in management happens, levels of trust and reciprocity promote fewer instances for enforcement, and therefore integrating enforcement into the new management structure.

However, critics of catch share systems (including a majority of U.S fishers) cite this approach as a method for “privatizing the commons.” They point to the dangers of consolidation by big industrial fleets as the ultimate demise of the small scale commercial fisher. Others argue that lifestyle fishermen are subordinated into business fishermen as a result of these systems (Carothers 2008). What was once “place based lifestyle fishing” is at risk of being replaced with individual private fishing rights for few (Carothers 2008). Additionally, high entrance costs after quota allocation can make it difficult for new fishers or younger generations to enter the system. For crew members that do not own their own boat or equipment and have fished throughout their lives, LAPP’s exclude them altogether from quota allocation (Carothers 2008). In general, U.S fishers are reluctant to endure another intervention

by government after nearly forty years of increased regulations. In some cases, distrust of regulations and government interventions can increase this reluctance while in other cases such as asymmetrical access to information results in some fishers that lack complete knowledge on these systems (Carothers 2008).

A recent case study in Kodiak, Alaska cited several concerns about catch share systems on subsistence fishing communities. Profit making mentality not originally characteristic to the community led to other changes in social structure such as larger income disparities between families as a result of rationalization (Carothers 2008). As wealth increased community politics and tensions also grew. The once ingrained cultural values system became institutionalized by means of competition and individualism; a characteristic that the community never experienced. This shift in values prompted community members to perform less altruistic favors for one another. Related studies indicated that rationalization constrained diversity and flexibility of fishing opportunities for fishers in rural communities and fundamentally recomposing relationships between fishermen, communities, and resources they depend on (Carothers 2008).

The implementation of a catch shares systems begins with calculations of a total allowable catch (TAC) determined by fisheries scientists for a specific fish stock. The system relies on initial stock assessments to establish biologically sustainable maximum yields that are then divided into quota. After establishing the TAC, the most contentious stage of implementation occurs during the initial allocation of quota or “shares.” A fisher’s allocation can be determined by numerous variables including landings history, gear type, boat size, or residency. This part of the implementation process can be long and controversial. It often takes

many years before optimal conditions are met and although this is expected by managers, fishers are less willing to weather the storm. In addition, allocation is often redistributed after a specified time period. This allows for fishers to familiarize themselves with the system and eventually experience a larger TAC as fish stocks recover.

Unfortunately, not everyone can benefit in a catch shares system. After all, the biggest problem in commercial fisheries is overcapacity. It would be unrealistic and impossible to believe that every fisher could continue fishing at current levels without a complete collapse of the global fish stocks. Catch share supporters claim that the system minimizes the amount of fishers pushed out of the system and that socio-economic consequences are negligible. While on the other hand, fishers that oppose catch shares suggest that it is not economically advantageous to leave unemployed fishers with nothing else to do and limited access to collateral financial institutions (Carothers 2008).

There are various adaptations to each of these types of quota allocation schemes. Currently, there are three types of LAPP programs: individual, community, and associations based allocations. Community quota programs are advantageous for many reasons including their sensitivity of cultural and economic significance of fishing on small scale communities. Although this type of catch share program is highly dependent on the community it targets, scholars argue that community based quota systems need to ensure community based lifestyle fishing for fishers and include “place based models of community ownership and control of fishing rights (Carothers 2008).” By initiating a bottom-up approach in combination with fewer top-down measures, a community catch shares system has the potential for repositioning the operational structure towards a more nested governance system (Ostrom 1999).

Commercial Fisheries and the Commons

Society's relationship with the oceans and its multitude of resources has evolved over centuries of interactions. However, only within the past forty years have formal regulations been enacted to attempt to control fishing activities in U.S. waters. Today, global fish stocks are in rapid decline while seafood consumption continues to increase at exponential rates. With demand high and the remaining supply scarce and highly regulated, small scale fishers in the U.S. are forced to take dangerous physical and economic risks to maintain their livelihoods. Unfortunately, the depleted status of today's global fish stocks is not an easy economic or biological puzzle to solve. Despite over four decades of formal fisheries regulations, most global fish stocks are continuing to decline while the humanly demand on them continues to grow. In order to completely understand the struggle to end overfishing, it is important to first examine the interconnectedness of social ecological systems and how these relationships affect human behaviors within the "commons."

Complexity and Social-Ecological Systems

Since the origins of humanity, the human experience has centered around a vital reliance on the natural environment. Over thousands of years, the relationship between humans and their environment has evolved into a tightly woven dependency. This relationship has since expanded into a complicated mosaic of embedded interactions between humans, their environment, and the rules they set for managing natural resources. The field of political ecology has approached this issue of complexity by focusing on interlinking livelihoods, landscapes, cultures, and institutions (Rocheleau 1999). Political ecologists often refer to these

complex networks of relationships between humans and the environment as a social ecological system; a system that integrates humans and the natural environment.

Characterized as intricate webs of relationships, these systems typify the levels of complexity inherent to human societies and therefore are fundamental to our understanding of natural resource management. Social ecological systems also serve as valuable units for understanding multiple layers of human relationships such as embedded power structures. Broken down, these systems can start as simply as understanding one fisher's relationship to his natural environment and escalate in complexity. Natural resource management plans such as those used in fisheries management are components of social ecological relationships that link people to one another and to other ecologies, economies, and cultures from the local to global scale (Rocheleau 1999). Each community presents a unique, interwoven network of relationships and experiences for each of its members which in turn determine how a specific management plan could change these relationships and ultimately be successful at protecting the fish stock and the community. In becoming more conscious of the complicated conditions that people live in, scholars can build a "vast array of principles and components that could be constantly recombined, tested, and modified to suit changing social, economic, and ecological conditions (Rocheleau 1999)."

Thus, by viewing communities and the networks between them as dynamic, nested and overlapping, it becomes obvious as to why managers need to garner support from the community they are working with. All people within social and ecological systems are bounded by these types of networks born from any number of social or biophysical factors such as identity (gender, race, and ethnicity for example), or geography (Rocheleau 2001). In order to

understand how social are incorporated into fishing communities, there is a need to make four general assumptions. Because studying and calculating an effect on social systems is not a quantitatively exact science, it is crucial to provide maximal clarity in all aspects of research. The following general assumptions were adapted from the *International Handbook of Social Impact Assessment* published as a tool for researchers to facilitate the understanding of how fisheries dependent communities operate. The first assumption states that we must assume that the relationship to fishing in these communities is fundamental to their cultural identity and well being. Next, in a corollary to the first assumption residential continuity is seen as a measure of cultural continuity including the persistence of traditional customs and practices associated with sense of self, identity, and ownership of place. Thirdly, fisheries when viewed simply as a resource, will act as a basis for continuity and cohesion of family and community by providing the economic means necessary. And finally, the integrity of a fishery and its ecosystem are the primary determinants of the quality of life within a fishing community (Daneke et al. 1983)

An exploration of the identification of potential social implications on a community must include a discussion on how social impacts are recognized by a community. Impacts are perceived and experienced differently by different segments of a population. The way in which an individual or community identifies a disturbance affecting their human environment is defined as social construction of reality. Every player in a human system has varying constructions of reality (NOAA 1994). In addition, communities (rarely homogenous entities) can be broken up into smaller entities based on similar social constructions of reality. Appropriately, a community can consist of numerous and often overlapping social groups.

These groups can include the vulnerable segments of the population such as the elderly, sick, poor, or unemployed. They can also include minority groups that are divided along racial, ethnic or cultural distinctions or occupational such as commercial fishermen, cultural, political, or value based (NOAA 1994)

Commonly cited as an example of the *“tragedy of the commons,”* fisheries are widely studied by scholars in fields ranging from economics to anthropology. Many point to the inadequacies of top down regulatory approaches in managing fisheries as an obvious indication that common-pool resources should be managed differently. “A considerable disjunction exists between currently accepted policy recommendations, based on well-received theories of human behavior in commons dilemmas, and evidence from the field (Berkes et al. 1989).” This discord originates at the evolution of “conservation” and “rationalization” paradigms that has led to the polarization of conservationists and economists. Both schools of thought have dominated the natural resource management world for years and are responsible for driving management policies until now. Yet, a majority of management policy has remained continually unsuccessful. Scholars reason that this discourse does not capture the fundamental problem of resource management because it fails to recognize the social underpinnings that create common-pool resources and make them distinct in the first place (McCay 1996). Instead the conservation and rationalization paradigms place little or no importance on the social ecological relationship between communities and a resource.

The Dilemma of the Commons

Since Garrett Hardin's 1968 article coined the ubiquitous phrase "tragedy of the commons" to describe the inevitable demise of natural resources, common-pool resource scholars have looked to Hardin's terminology to explain the ever present "dilemma of the commons." Fishing grounds, along with water, trees, and air are often referred to as elementary examples of the tragedy of the commons. These common pool resources each share two main characteristics: excluding or limiting other users from using the resource is difficult and one person's use or consumption of any unit of the resource makes those units unavailable to other users" (Ostrom et al. 1994). As a result of these characteristics, common pool resources can be heavily overused or extracted if they are not managed correctly. Presently, as fish stocks decline worldwide, the incentives for fishers to continue to overfish is rising. Without proper management institutions, the pressure to continue fishing goes unabated while the environmental and economic costs continue to soar.

Natural resource management has forced decision makers to explore the fundamental components of common-pool resources. Historically, the complex origins of these resources are rooted in socially defined property rights regimes. Despite being culturally driven, scholars have traditionally used bioeconomic models to drive management policies (McCay 1996). As a result, common-pool resource management has mostly excluded human dimensions and instead focused on biological and economic calculations to make policy decisions. "The error is in the failure to recognize that property derives not from nature but from culture. It does not refer to things but to social agreements about how humans relate to things"(McCay 1996). The complexities inherent in property rights are fundamental to understanding how individuals or groups construct their own systems for management. By ignoring the inherent social

dimensions of property rights, management policies have been largely unsuccessful in uncovering the true dilemma of the commons.

Still, scholars have dismantled Hardin's "tragedy of the commons" theory on the basis of the assumptions it makes on human behavior. The first controversial assumption Hardin makes is that humans are "norm-free maximizers" (Ostrom 1999). In other words, humans do not follow any socially constructed set of standards and work individualistically to maximize their own profit (Hardin 1968). In reality however, human actions are rarely completely removed from societal norms.

"A diversity of studies illustrate that it is not impossible to overcome the temptation to overharvest. Many small groups that use common-pool resources have developed a diversity of norms and rules that have enabled them to solve problems of overharvesting" (Basurto and Ostrom 2009).

Similarly, Hardin assumes that outside authorities are necessary for implementing and enforcing management rules because individuals, acting as single entities would overexploit the resource (Hardin 1968). However, case studies have indicated differently.

Defining a "Community"

In order for any type of management plan to be successful, full participation of the community is critical. In this regard, a social assessment also requires a proper definition of the term "community." While numerous definitions exist, an agreed upon standard approach to defining a "fishing community" has been difficult to construct. According to the Magnuson Stevens Fisheries Management and Conservation Act of 1976 and the 1996 reauthorization, a fishing community is defined as:

“a community that is substantially dependent on or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew, and fish processors that are based in such communities. A fishing community is social or economic groups whose members reside in a specific location and share a common dependency on commercial, recreational, or subsistence fishing or on directly related fisheries-dependent services and industries (for example, boatyards, ice suppliers, tackle shops).” (16 U.S.C. §1802, Sec.3, 104-297 (16))

Through this definition it is seemingly clear what components constitute a fishing community. Yet, the reality is that communities are not as straightforward as this definition suggests. The jumbled intricacies inherent to communities are blatantly missing from this definition. The first step for assessing social impacts is in acknowledging that concepts of “community” include various social divisions that are constantly being experienced and negotiated (Forsyth 2003). Unsurprisingly, the methodologies available for identifying communities are vast. The most common and simplest approach involves drawing boundaries around geographic entities using aggregations of census tract data. Both of these approaches raise fundamental concerns for any type of community-based assessment because of the countless components that they leave out. Simply, delineating communities as discrete entities can ignore important cultural or ecological aspects integral to a community’s social structure.

For fishing communities in particular, socio-economic data can result in misleading community profiles. As a result, census data cannot be relied on as the sole data source for depicting a complete economic and social picture of fishing communities. Due in part to constantly changing work forces, the social compositions of fishing communities are constantly

in flux. Hence, there are many opportunities for census data to mistakenly exclude participants in their community profiling. Another problem resulting from community delineations based purely on economic or demographic data is in how fishers classify their occupations on census forms. For example, some small scale fishers may classify themselves as “independently employed” while still others may choose not to mark themselves as fishers if they fish part-time or illegally as is the case in countries with poor enforcement. Obviously, to understand the full extent of a new management plan (such as a catch shares system) on a community’s social infrastructure, managers need to account for all of the miscellaneous components of communities that are not already aggregated into neat pre-fabricated package.

Social analyses that only use census or economic data for developing community profiles of fishing communities are also biased in that they exclude the marine environment and focus exclusively on communities’ terrestrial interactions. Fishing grounds are where fishers spend a large portion of their time and as a result are settings of social and ecological importance (St. Martin and Hall-Arber 2008). Although the ocean is not typically considered “home” to fishers, it is still a place where human interactions take place and social ecological relationships are carried out. These two geographies are often viewed as mutually exclusive yet in actuality they are tightly coupled systems, which can be useful in revealing embedded social networks (St.Martin and Hall-Arber 2008). Natural processes dictating fisheries biology can rapidly change a community’s social composition by forcing constant re-combinations of social structure and rule making. The relationship between the marine environment and fishing practices is a crucial linkage for managers to understand as they reveal a community’s rule making structure and potential for successful policy making. Therefore, in the case of fishing

communities, inclusion of both terrestrial and marine spatial domains is necessary for development of accurate community depictions.

Studies focused on unraveling the complexities within fishing communities have attempted to use an assortment of methods for enclosing a community. Kevin St. Martin and Madeleine Hall-Arber's 2008 study advocates for participatory mapping methods that increase the presence of community members in community defining. Although the simplicity of two dimensional mapping can mask out complex social ecological relationships, participatory community mapping can do the opposite as well as reinforce groups, communities, and cultures (Rocheleau 2005). Political ecologists such as Dianne Rocheleau involve participatory methods in a majority of their work and agree that when carried out correctly, community mapping projects were invaluable for gathering insight into community dynamics. "The work of community based mapping may be best described as an arranged encounter between a global positioning system and a local repositioning system (Rocheleau 2005)." Pointing to the apparent lack of community involvement in fisheries management, St. Martin and Hall-Arber encourage participation in their project and blame social impact analyses for undermining a community's capacity for self-management by exclusively pointing out weaknesses. To expose potential community strengths rather than weaknesses, their investigation aimed to study "community processes rather than boundaries, and to embed them within the marine environment, rather than relegate them to ports" (St. Martin and Hall-Arber 2008). In their study, St. Martin and Hall-Arber found that maps were useful in provoking personal narratives and dialogues while uncovering networks and linkages. Their findings not only exposed buried social processes but also established new meanings of community and the "commons" for the participants.

Confining communities to arbitrary geographic units or simplifying them to economic variables ignores the social ecological complexity built into marine based communities, resulting from their shifting, heterogeneous community compositions and the unpredictable nature of fisheries. In this way, assessing changes to community social structure and capital can be difficult. Nevertheless, the social assessment process can offer a more thorough understanding of these communities and ultimately generate more accurate definitions of study communities as long as definitions of community include both spatial (terrestrial and marine) domains and all relevant embedded social processes. "Community as a geographically defined container of socio-economic indicators, designed to gauge impacts, works to not only position communities as threatened and in retreat , it also positions them within the terrestrial geographies of socio-economic data collection (St. Martin 2006)."

Accordingly, the methods proposed in this paper are built around the concept of "community" not as a specific geographic unit but as a collection of processes born out of entrenched social ecological systems. Essentially, the framework that this paper adopts is a tool for better understanding the intrinsic relationships between human and biological processes. At the core of the analysis lies the development of a more comprehensive understanding of embedded community processes or definition of "community."

Methods

Phase I. Literature Review

The methods applied in this project involved a combination of theoretical frameworks and indicators used in the final analysis. The first step in the study began at the most basic level and involved gaining a better understanding of social assessment both on a theoretical and

methodological level. Prior to beginning an assessment of possible social impacts a working definition of “social impact” was essential. According to the *International Handbook of Social Impact Assessment*, social impacts are defined as “changes to individuals and communities due to proposed action that alters the day to day way in which people live, work, relate to one another, organize to meet their needs and generally cope as members of society (Becker and Vanclay 2003).” Further, they may include “cultural impacts involving changes to the norms, values, and beliefs that guide and rationalize a community’s cognition of themselves and their society (NOAA 1994)” In clarifying this term, one can acknowledge the necessity for critically examining a community’s social foundations before and after implementing fisheries management plans such as catch shares. Thus without previous knowledge on how a community is socially constructed it would be difficult to imagine how the community’s social structure could behave after implementing a new management structure. With regard to appraising social impacts on communities it became clear that not only was it necessary to develop in-depth criterion for basing my evaluation but also a model for systematically assessing social effects on community.

Literature Review	IAD Framework	Qualitative Research
<ul style="list-style-type: none"> • Methodology • Background social ecological systems • Common-pool resource theory analysis • Fisheries management analysis • Case studies analysis 	<ul style="list-style-type: none"> • Theoretical structure • Conceptual organization • Identification of exogenous variables <ul style="list-style-type: none"> • Social capital • Rules <ul style="list-style-type: none"> • Informal • Formal 	<ul style="list-style-type: none"> • Participant observation • Informal interviews • Literature review <ul style="list-style-type: none"> • Historical records • Natural history

Figure 1. Research Methods

The processes for adopting a framework involved careful consideration of the available methodologies for analyzing rule making processes. Techniques for evaluating social impacts can include in-depth quantitative modeling where values are assigned to various criteria or qualitative approaches that employ surveys, semi-structured interviews, ethnography, natural history research and participant observation. Not any of these approaches alone could be considered comprehensive nor do any provide a complete appreciation of the social constructions of a community. Throughout the history of SIA, researchers have applied numerous combinations of quantitative and qualitative methodologies that make comparison studies nearly impossible. The scientific inability to standardize a process for evaluating a community's social structure exposed a multitude of issues that make social assessments so challenging. Aside from the inherently multifarious, non-homogeneous nature of communities that make each case study unique, issues of scale, methodology, and objective were commonly noted in the literature as challenging obstacles for development of community level

evaluations. The solution for overcoming these challenges was to shift perspective and view my objectives through the eyes of policy makers.

“Building ontologies to diagnose policy problems and to design empirical research is a necessary step toward developing better conceptual language and theories. The intention is to enable scholars, officials, and citizens to understand the potential set of variables and their sub-variables that could be causing a problem or creating a benefit (Basurto and Ostrom 2009).”

To that end, in order to effectively accomplish my objectives without losing an audience through theory laden methodology, I needed to structure my analysis around creating new ways of viewing the numerous challenges of systematically analyzing social impacts.

The intrinsically complex nature of communities compounds the task of creating a formula for assessing them but also raises challenging theoretical questions. As mentioned previously, one of the single most difficult obstacles in assessing community impacts is scale. On a theoretical level, the question of scale relates to the ability to formulate a foundation that is both broad enough to be universally applied while also sensitive enough to capture the distinctive characteristics of each community. This hurdle has challenged scholars throughout a wide range of academic disciplines. While many have attempted to provide a solution to this troublesome stumbling block, a universally agreed upon approach is still far from a consensus. Basurto and Ostrom suggest that organizing relationships around many variables supposes causal relationships across scales in all the places where these variables are embedded within a system, and ultimately linked to even larger systems. Hence, this approach carries specific potential for synthesizing ontological frameworks across scales (Basurto and Ostrom 2009).

Additionally, there needs to be space made available for potential ontologies that are formulated within the middle of the spectrum. “To build theory, it is necessary to move away from both extremes to develop an interdisciplinary diagnostic framework that helps to provide a foundation for further empirical research and learning (Basurto and Ostrom 2009).” Further, the authors recognize the necessity for a theoretical framework that incorporates interdisciplinary approaches for the achievement of more robust empirical studies (Basurto and Ostrom 2009). By way of partnership between ecology and social science, an opportunity for hybridization between these disciplines could reinforce their strengths and bridge a centuries old, institutionally predicated paradigm. This type of hybrid awareness could also work to transverse scales by putting locally based case studies into larger frameworks such as an institutionally situated framework (Forsyth 2003).

By approaching the dilemma of common-pool resource management in this way, researchers can avoid two common analytical traps (Basurto and Ostrom 2009). The first trap involves an overly generalized examination of a specific common-pool resource. This “panacea” trap considers an oversimplified profiling of the resources involved and essentially “risks losing track of the importance of context and history.” As a result, it excludes the complexity inherent in social ecological systems and can ultimately stifle further empirical research (Basurto and Ostrom 2009). The delicate interwoven relationship between social ecological complexity and functional experiential research demands a level of sensitivity that can record a particular level of intricacy.

The second analytical trap that Basurto and Ostrom present is the “my case is unique” dilemma. This conundrum takes an opposite approach to the “panacea” trap in that it calls into

question the utility of creating theoretical explanations to explicate wide ranges of unique social ecological systems (Basurto and Ostrom 2009). Scholars that support this rationale point to the abundance of distinct institutions constructed around precise local conditions. In this sense, the problem is born from “assuming that there are no commonalities across cases that can be the foundation for theoretical analysis, explanations, and diagnosis (Basurto and Ostrom 2009).” Consequently, the inability to generalize across unique systems generates few solutions for applying theoretical frameworks beyond a case by case method. “We need to avoid falling into the presumption that all individual settings are so different from one another that all we can do is describe the intricate detail of particular settings. It’s always a challenge to determine what those attributes or variables are at any one time (Basurto and Ostrom 2009).” While social scientists such as anthropologists and sociologists often gather an abundance of knowledge specific to their case studies, they often minimize the importance of applying their knowledge base to the larger contextual picture. By adjusting this approach to include a more elemental examination of their cases studies, these types of social scientists can integrate their research more readily and increase its utility broadly across various sciences.

In order to avoid the “panacea” and “my case is unique” traps, the foundation of my investigation relied heavily on incorporating my research objectives into a broader theoretical schema. The authors explain that “a diagnostic theory, to be useful, needs to draw on both general theory related to causal processes and learning how to identify key variables present or absent in particular settings so as to understand successes and failures (Basurto and Ostrom 2009).” Appropriately, the objectives of my investigation entailed integrating concepts of common-pool resource theory and complex social ecological systems in order to develop an

analytical framework. Through investigative research into these various theories, I created a blueprint to base the subsequent components of my investigation from.

Phase II. Theoretical Analysis

The next step for building the analytical framework involved compiling an all inclusive list of indicator variables that I would use for assessing the effects of a catch share system on each community's social capital. This phase was specifically difficult as it was vulnerable to both analytical threats described earlier as well as scalar, spatial, and temporal issues. What types of variables would successfully bridge all of these problems without oversimplifying or over contextualizing the research question? The first step in this phase involved compiling a large list of potential indicators. The second portion of this phase involved whittling down the list to an appropriate number by cohesively weaving in larger theoretical aspects into the analysis, conducting an intensive literature review, and evaluating census data. In order to accomplish this, I looked to the underlying theoretical groundwork from step one, to develop a connectivity matrix. This matrix drew connections between indicators and traced back each indicator to an element of social capital or process essential to complex social-ecological systems that previously recognized through my research. I constructed this portion of my investigation around my initial research objective of informing policy makers and citizens of the indicators I chose and clearly explaining why those indicators were important to the study. Following this guideline, I formulated a comprehensive list of indicators (Figure 2.) to use in the analytical segment of my study. For this particular process, I applied the first two tiers of analysis from the multi-tier framework for analyzing social ecological systems adapted from Basurto and Ostrom's 2009, *Beyond the Tragedy of the Commons*.

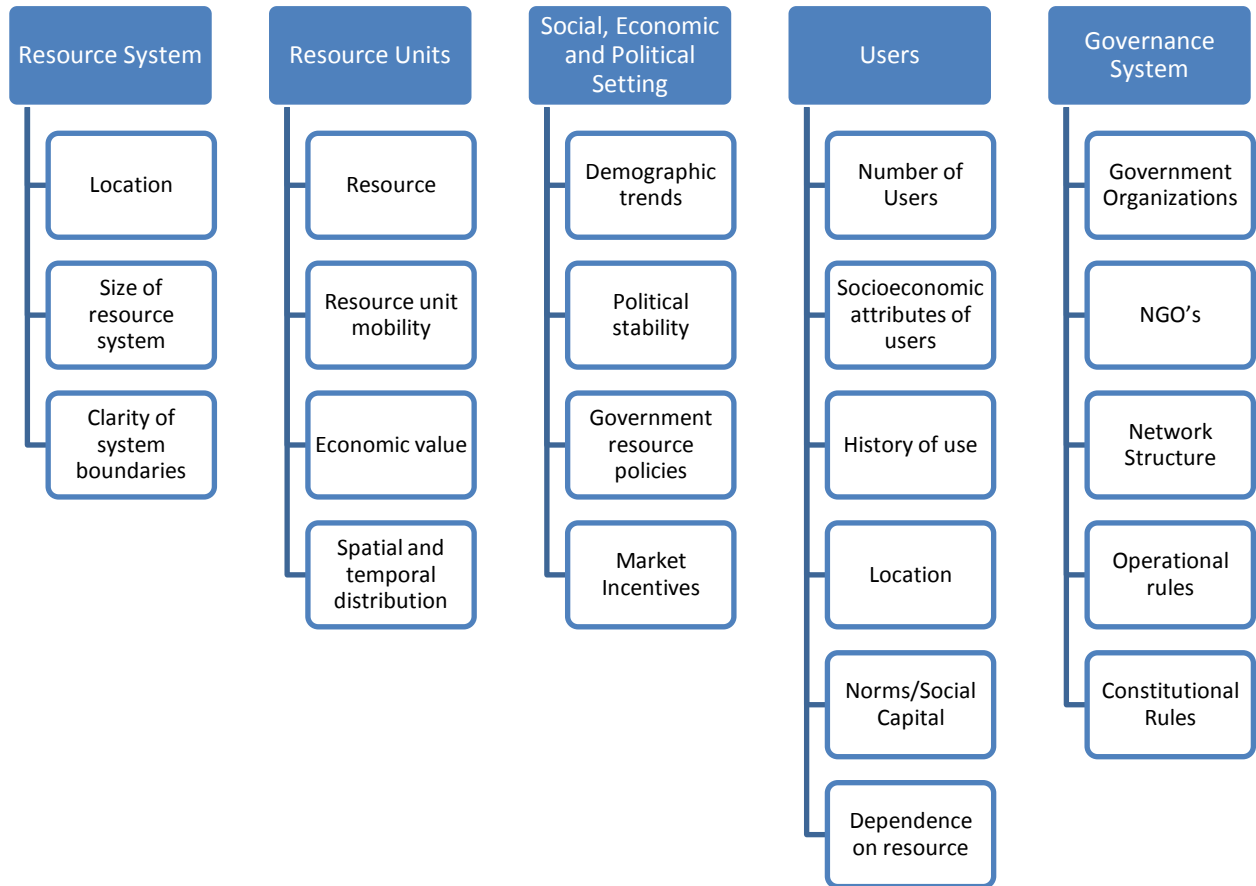


Figure. 2

Source: Adapted from Basurto and Ostrom (2009)

Phase III. Adopting an Analytical Framework

As the primary function of this investigation was to educate policy makers and citizens on making more informed policy decisions through the incorporation of a social analysis metric for fisheries management systems, the next phase of my research involved incorporating a framework to base my analysis on. At its core, my research objectives called for a method of analysis that could function on multiple scales. In order to accomplish this type of analysis, a structure or foundation for organizing the theories and ideas that I had compiled was particularly necessary. As a result, the third part of my inquiry involved placing my research objectives onto a conceptual scale based on varying levels of theoretical analyses: frameworks,

theories and models (Koontz 2003). According to Schlager, “a framework specifies classes of variables and their relationships to each other, providing a kind of intellectual scaffolding that gives a coherent structure to inquiry (Schlager 1999 in Koontz 2003). This type of analysis allows users to apply theories into a foundational structure. Ostrom adds that frameworks also serve to help analysts identify pertinent theories for their research questions (Ostrom 1999). Moreover, frameworks allow for the integration of theories from a wide range of disciplines at multiple levels or domains (Koontz 2003). For the purposes of this study, the other conceptual categories (theories and models), were overly restrictive and were found to be less applicable to my study.

The Institutional Analysis and Development (IAD) framework was developed by Elinor Ostrom and colleagues as a tool for analyzing institutions, public policies, and collective action. Ostrom developed the IAD framework at the Indiana University Workshop in Political Theory and Policy Analysis over the past thirty years (Ostrom 2005). The IAD framework organizes actions into various stages including: initial conditions, definitions of an action arena, patterns of interactions and their outcomes, and existing evaluation criteria. Using this organizational structure, the IAD framework specifically examines the interrelatedness between human behaviors and their corresponding actions within institutional settings (Ostrom 2005). An IAD framework is useful for revealing embedded networks or institutions and uncovering important caches of information through extensive studies of property rights, decision making processes, and bundles of situated knowledge

In further explaining the basis of the IAD framework, Ostrom defines an institution as “simply the set of rules actually used (the working rules or rules-in-use) by a set of individuals to

organize repetitive activities that produce outcomes affecting those individuals and potentially affecting others (Ostrom 1992).” That is, institutions both are capable of constricting and enabling the choices that an individual can make (Bromley 2006 in Smajgl et al. 2009). Therefore, the IAD framework acts as a structural organization for depicting the set of rules facing an individual before, during, and after any situation by aggregating these rule making entities into institutions. And since environmental outcomes are based on many factors including strength and structure of people’s affiliation with social organizations of various types, I found the IAD framework to be a logical choice for adopting in this study (Rocheleau 1999).

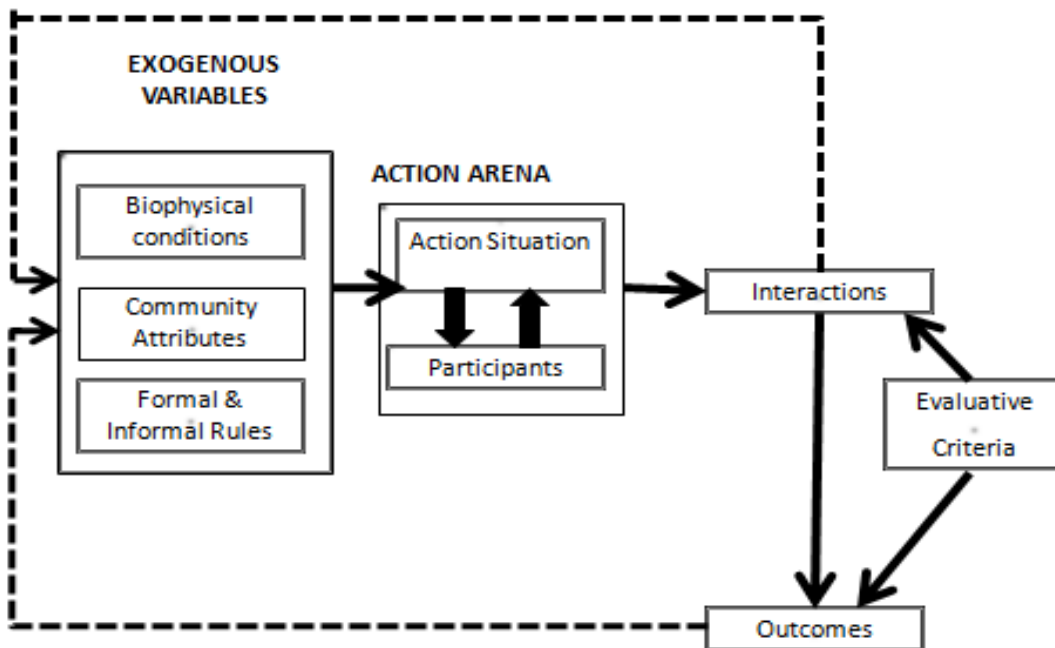


Figure 3. The Institutional Analysis and Development Framework
 Source: Ostrom 2005

According to Kiser and Ostrom (1982), the five elementary parts necessary for explaining individual behaviors within an institutional setting include 1) the decision maker, 2) the community affected by the decision maker, 3) events or goods and services that interacting individuals seek to produce or consume, 4) institutional arrangements guiding individual decisions, 5) the decision situation in which individuals make choices. Each of these components is addressed in various parts of the IAD framework and was helpful for directing the methodological approach I used for this project. Moreover, these five components typify the elements used in the IAD framework that when carefully analyzed, serve to identify “specific kinds of action situations as well as the types of rules that users have evolved over time to try to govern and manage their resources effectively (Ostrom 1999).” Ostrom (1999) points to several Universal Components that are present when individuals interact on a continuous and structured basis. These components include: participants, positions, actions, outcomes, transformation functions linking actions and outcomes, information, and payoffs (Ostrom 1999). In combination, they compose the action arena of the IAD framework.

Each action arena is affected by exogenous variables that are broadly labeled as biophysical conditions, community attributes, and rules. The results of an action arena lead to interactions amongst participants that ultimately result in a series of outcomes based on evaluative criteria. The outcomes from the interactions between participants are then realigned and can be re-entered as new exogenous variables for a new action arena. The evaluative criteria used for evaluating the interactions and outcomes can vary by stakeholder group and their priorities.

An action arena or situation is composed of participants (or “decision making entities”) playing specific roles through assigned positions and taking various actions based on the available information they possess as well as their interpretation of how their actions will ultimately affect possible outcomes. Actions can be defined in terms of both making a change in behavior or the decision to not change (Ostrom 2005). Also included in the action arena is an evaluation of the cost benefit considerations that each participant uses in their decision making processes. Similarly, the amount of control that a participant possesses over an outcome is also evaluated (Ostrom et al. 2004). Access to information and the extent of control are significant elements to the action arena action (Ostrom 2005). Collectively, these components constitute the “internal structure” of action arena and demonstrate how participants make choices within a specific institutional setting.

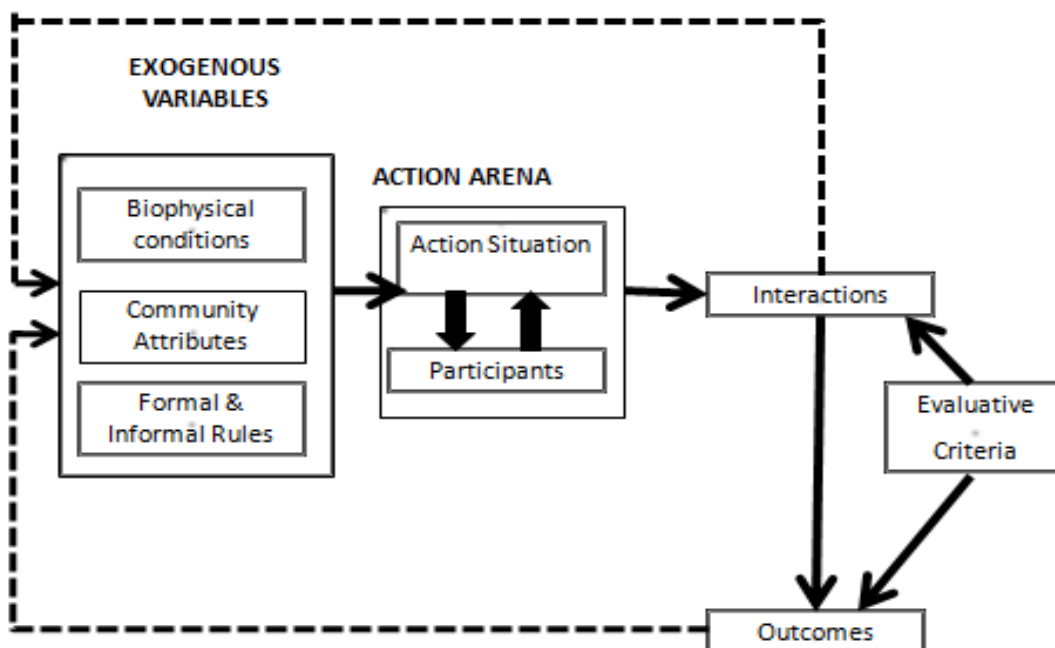


Figure. 4 The Internal Structure of an Action Arena
Source: Ostrom 2005

Linked to the action arena and part of the internal structure of an action arena are outcomes. The outcomes within the IAD framework include the physical results of interactions between participants as well as the valuation process participants make in terms of the final outcome of the action (Ostrom 2005). The physical results include the actual decision or agreements that were created during the interactions step. Another other significant result of the outcome stage includes an understanding of participants' internal valuation process. "The intrinsic valuation attached to an external reward or sanction is the internal value that individuals associate with the components of the rewards or sanctions (Ostrom 2005)." The internal appraisal process by participants is useful to study because it can uncover perceived costs and benefits as well as identified pay-offs, motives, or incentives that arose during the action (Ostrom 2005). During the initial stages of research, studying just the physical outcomes of an action can be helpful for gaining a generalized understanding of the underlying components that are driving an action situation. Ultimately, the relationship between an action and its outcomes is a critical linkage that can lead to direct correlations between exogenous variables, an action, and its outcomes.

The "exogenous variables" within an IAD framework involve physical attributes, community attributes and formal and informal rules. These variables are important in that they are critical to shaping each action arena and can essentially drive any set of outcomes. The application of the IAD framework requires rich information on physical conditions of the region, including physical characteristics involved that are specific to the nature of the resource under investigation (Smajgl et al. 2009). In terms of this study these characteristics can include biological components of a fishery such as the life history, reproductive characteristics, and

habitat of a fish stock. The community attributes component is a broadly applied term and can involve many aspects of a community that might affect an action or outcome. Examples of community attributes include demographic data, economic census data, or employment levels. For the purposes of this study, elements of social capital were specifically investigated. Elements such as instances for trust and reciprocity, knowledge sharing, and social networks were of particular interest because of how they can be applied to determine a community's capacity for change through a LAPP system. Finally, a very important component of the analysis is the rules (rules-in-use or working rules) variables that examine the formal and informal rules in place throughout an action situation. These rules govern how participants behave during an action situation. The working rules can indicate why certain participants are allowed to make decisions as well as the processes in place that allow or prohibit actions or decisions (Smajgl et al. 2009). Examples of rules can include residency, gear types, or fish species (Ostrom 1999). In general, the exogenous variables included in the IAD framework provide analysts with the vital background knowledge they need to fully understand an action situation. As exogenous variables change, the opportunity for new rule formations and interactions occurs.

Further study into the rule making processes within an IAD framework showed that the rules (working rules or rules-in-use) category can be broken down into seven categories, each corresponding to a component of the internal structure of an action arena. The groupings of rule types include boundary rules, position rules, choice rules, payoff rules, information rules, scope rules and aggregation rules (Crawford and Ostrom 2005). This typology of rules creates an opportunity for further exploration into rule making processes as well as developing better understanding of the formal and informal rules actively followed within a community. "The

diversity of rules devised by users greatly exceeds the limited authority rules that are recommended in textbook treatments of this (common-pool resource) problem (Ostrom 1999).”

As a result, examining only formal governance institution rules can lead to a partial understanding of embedded rules and processes. To understand the complete set of rules present within a community it is necessary to penetrate deeper into an institutional ecology. Fieldwork can be a successful method for revealing various types of rules within and institutional ecology (Ostrom 1999). Not any one rule or combinations of rules are best for managing common-pool resources (Ostrom 1999). Moreover, the convolution of action sequences makes it troublesome for predicting the effects of changing rules on an outcome. And so forecasting outcomes based on any number of variables and rules can still lead to uncertain or unexpected results.

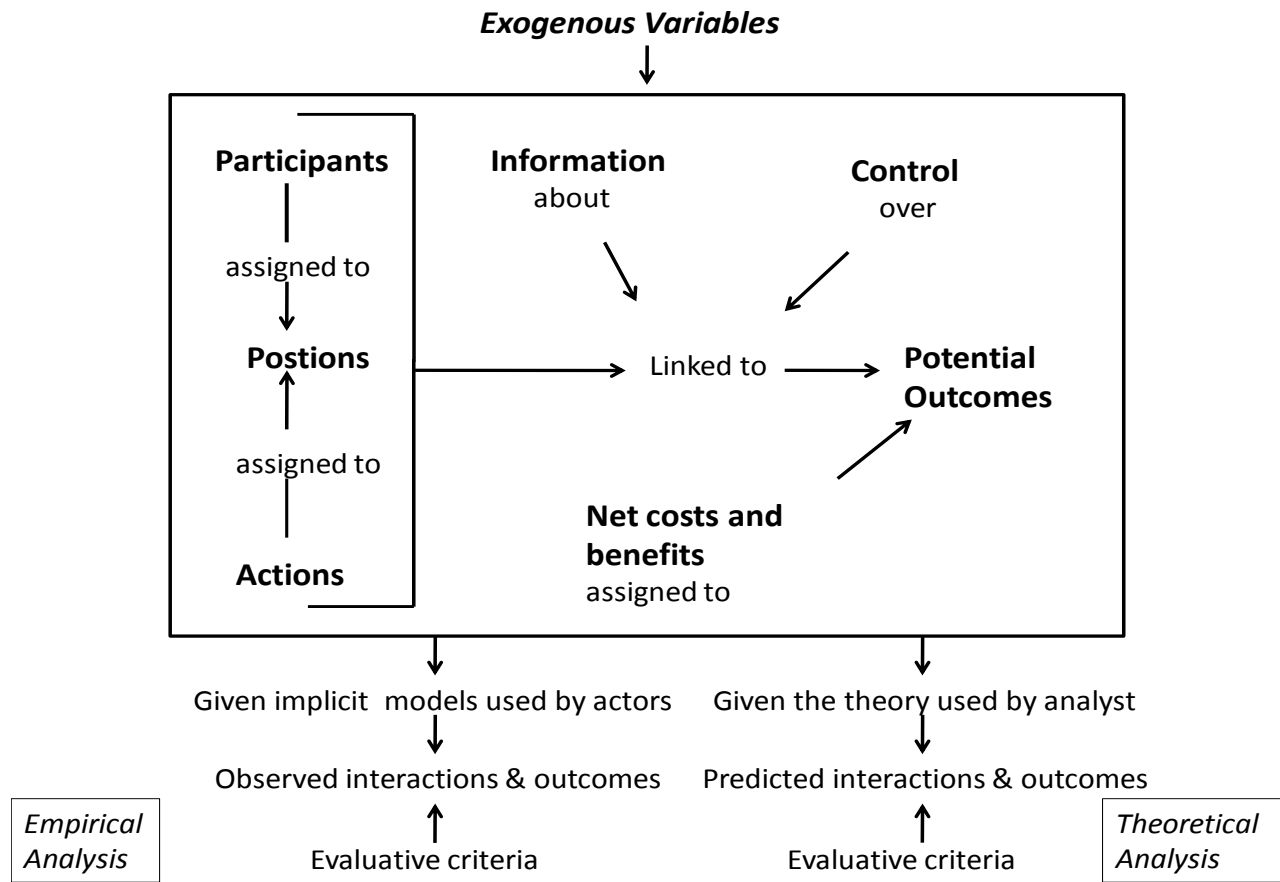


Figure. 5 Types of Rules
 Source: Ostrom 2005

Case Study Results: North Carolina Snapper-Grouper Complex

Resource System and Resource Units

The snapper-grouper complex is a complicated, multi-species aggregation involving 73 of the 88 SAFMC regulated fisheries (SAFMC). However, not all of these species are specifically common to North Carolina. Some of the commonly landed species in North Carolina include amberjack, American red snapper, vermillion snapper, gag, black sea bass, golden tilefish, grunt, hogfish, red porgy, red grouper, scamp, snowy grouper and triggerfish (Cheuvront and Neal 2004). This fishery spans geographically from southern North Carolina to the Florida Keys

and into the Gulf of Mexico. However, for the purpose of this investigation, the study area was defined as the southern portion of coastal North Carolina from Cape Hatteras southward.

Many of the species included in the snapper-grouper complex are slow growing, long living species. These species are characteristically slow to reach reproductive maturity and typically have low fecundity. Also, a large proportion of the snapper-grouper complex is deepwater dwelling species which further complicates protection measures (SAFMC). A cumulative result of the biological characteristics of the snapper-grouper complex including its complex multi-species organization is that management is significantly challenging. Still, the snapper-grouper case study illustrates some of the universal problems associated with the biological component of fisheries management. Because of difficulty in mapping marine habitats, fisheries models have frequently presented challenges to humans as a result of their inability to completely experience marine ecosystems to their entirety. Consequently, the ocean and fisheries systems continue to pose a higher level of uncertainty for humans wishing to manage them. In fisheries management, uncertainty in stock assessments that are needed for development of a TAC can signify considerable economic losses for fishers.

Social, Economic, and Political Settings

Rising fuel prices are being blamed as the ultimate demise of many small scale commercial fishers including those in North Carolina snapper-grouper communities. With the price of fuel at a record high and little chance for prices to revert back 1970's numbers, many fishermen have been forced to limit the number of trips they make and hence reduce their earning potential (Cheuvront and Neal 2004). In effect, the total cost per unit of effort (CPUE) for the small scale commercial fisher has become economically unsustainable in nearly all

reaches of the globe. For countries with strict environmental regulations, such as the U.S, competition from foreign fishing fleets operating under looser environmental regulations has dramatically damaged domestic seafood prices.

In addition to the economic hardships stacking up against fishing communities, recent changes in lifestyle values throughout the general American public have signaled an increase towards leisure lifestyle mentality and has lead to surges in coastal tourism development. This type shift in norms has initiated a string of changes to the social structures of North Carolina fishing communities such as the Wilmington and the Beaufort Morehead City area. These communities are major tourist destinations during the summer months and retirement havens throughout the rest of the year. As the baby boomer generation has entered retirement age, a new outlook on lifestyle has spread throughout the country. More well off economically and seeking relaxation after years of hard work, a general shift towards a leisure lifestyle has clearly taken place. Until recently, economic times had remained relatively stable and as a result retirees have the financial wherewithal to purchase second homes. Along with this type of lifestyle has come an interest in luxury developments, recreational game or sport fishing, and tourism related activities. These changes have put immense pressures on coastal communities as they have been targeted for their pristine coastal landscapes. As this segment of the population seeks out peaceful coastal retreats to relocate to or to purchase as second homes, the market for coastal development has blossomed. In the U.S, states like Florida and North Carolina have seen spikes in coastal condominium and luxury home developments. Unfortunately, these types of large scale developments have left many fishing communities all but transformed into vacation spots. New coastal development projects not only jeopardize

access to working waterfronts but they obstruct scenic vistas and lead to feelings of resentment by community members. Likewise, a surge in recreational fishing popularity intensified by general shifts in first world nations seeking leisure lifestyles, has cultivated powerful tensions between the recreational and commercial fishing sectors in scores of coastal communities.

The move away from hard working lifestyles that has been largely the way of life for most fishing communities has instigated a wave of development in once socially isolated communities. These development changes and influx of outsiders to the area have caused substantial changes to the social structures of these communities. A surge in coastal real estate prices has caused a steady influx of outsiders into many small, tight-knit North Carolina communities including snapper-grouper communities. With this momentum, there is a potential for transformations to values systems that used to characterize these communities. Accordingly, during this time of future uncertainty, residents in coastal communities all over North Carolina have been forced to face difficult decisions about their communities and themselves as individuals.

Certainly, increases in tourism and recreational fishing offer opportunities for alternative employment; however shifting away from long embedded social ecological processes can mean stark changes to the institutional arrangements currently in place. For historic fishing communities that can no longer retain younger generations in their commercial fishing industry, this could signal a departure from longstanding commercial fishing practices and a large-scale deviation from fishing (West and Garrity-Blake 2003). To this end, several looming questions hang heavily in the air for these once thriving fishing communities. Is it realistic to try and “save” these communities from social and economic collapse? Can new

management structures like LAPP's be successful in promoting a community's social well-being? Or are LAPP's threatening to the embedded social ecological system that once made them strong? To what end does the presence of social capital play in how well a community can shift rule making processes and adapt to a LAPP? Alternatively, what are the specific traits that make a fishing community more resilient to increased rates of change in their social composition? Finally, and most importantly, can these communities survive socially without sustainable fishing practices in place?

Governance and History

In North Carolina there are five possible governing bodies acting on any type of fisheries exploitation at any one time with the exception of highly migratory species. This governance mosaic includes the federal government, federally mandated regional fisheries councils, and the state of North Carolina Department of Marine Fisheries. Within these levels of governance are two of the most important pieces of environmental and fisheries related legislations: the National Environmental Policy Act and the Magnuson-Stevens Fisheries Conservation and Management Act. These two acts are responsible for laying down the necessary legal frameworks for socially conscious fisheries management.

As a result of the cultural and political confluence as well as building concerns for environmental conservation in the 1960's, the National Environmental Policy Act (NEPA) was enacted in 1969. This act followed the Stratton Commission's report entitled, "Our Nation and the Sea" in 1966 that outlined a national plan of action for ocean resource exploitation. The following year President Richard Nixon created the National Ocean and Atmospheric Administration (NOAA) to manage the U.S public trust ocean resources under the Department

of Commerce branch of the federal government. The main purpose of NEPA was environmental enhancement through the establishment of environmental accountability measures called environmental assessments (EA) and environmental impact statements (EIS) for any all “major federal actions significantly affecting the human environment (NEPA P.L. 91-190, 42 U.S.C. 4371 et seq.).” This aspect of the act has remained an integral component of all environmental planning and decision making to date.

Aside from laying the foundation for the most important environmental legislation (all occurring within the next eight years), residual effects from NEPA ultimately led to the development of social impact assessments (SIA). In 1994 decision makers and federal agency planners acknowledged the need for more research on the potential social impacts of environmental planning decisions. Up until this point, most environmental decision making, including fisheries management plans, focused largely on purely biological consequences. Following a May 1994 meeting of social scientists, the Inter-organizational Committee on Guidelines and Principles for Social Impact Assessment was convened under the Department of Commerce through NOAA and the National Marine Fisheries Service (NMFS). The committee’s main objectives were to assist public and private interests in satisfying their NEPA obligations. The basis of this objective, aside from recognizing the importance of social impacts on communities, lies in the requirement outlined by NEPA stating that prior to taking “actions significantly affecting the quality of the human environment” an agency must first provide an EIS. In order to provide a well documented EIS social science integration is needed (NOAA 1994). Thus by requiring an EIS, NEPA also recognizes the significance of potential negative social consequence of environmental decision making.

Subsequent to the authorization of NEPA, the first fisheries based regulations were enacted in 1976 through the Magnuson-Stevens Fisheries Conservation and Management Act (Magnuson-Stevens Act). This act was characterized largely as a sustainable use regulatory act. Occurring during the U.S. environmental movement, the Magnuson-Stevens Act assigned regulatory power to NOAA and NMFS for the first time. NOAA, as a public trust agency, was granted management power to all states and ocean up to 200 miles through the establishment of the exclusive economic zone (EEZ) in the 200 Mile Law of 1983 under President Ronald Reagan. Included in the Magnuson-Stevens Act were ten national standards. These standards outlined requirements for fisheries conservation and management by stating that “any fishery management plan prepared, and any regulation promulgated to implement any such plan, pursuant to this title shall be consistent with the following national standards for fishery conservation and management.” Each of the ten national standards recognizes various important aspects of fisheries management such as the prevention of overfishing while maintaining an optimum yield as well as utilizing the best available science. National standard eight is of particular importance for investigating social impacts because of its focus on communities. It states:

“Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.” (16 U.S.C § 1851 (1996), Pub.L. 94-265, Sec. 301, (a) (8))

The act continues by providing an official definition of “fishing communities” discussed earlier in this paper as well as asserting the need for fisheries management plans to provide rationale behind a “preferred alternative that negatively affects the sustained participation of fishing communities.” Moreover, the Magnuson-Stevens Act established regional fisheries management councils to aid the federal government in creating fisheries management plans (FMP). The regional council system was “designed to allow regional, participatory governance of by knowledgeable people with a stake in fishery management” in federal ocean areas seaward of state waters within the EEZ. There are eight total fisheries management councils covering all U.S waters. North Carolina belongs to both the South Atlantic Fisheries Management Council (SAFMC) and the Mid-Atlantic Fisheries Management Council (MAFMC) although its role in the MAFMC is minor in comparison to that in the SAFMC. SAFMC council members serve three year tenure and are chosen by the Secretary of Commerce from state recommended nominees. Non-voting members include representatives from the Regional Fish and Wildlife Services, the U.S. Coast Guard, the State Department and the Atlantic States Marine Fisheries Commission.

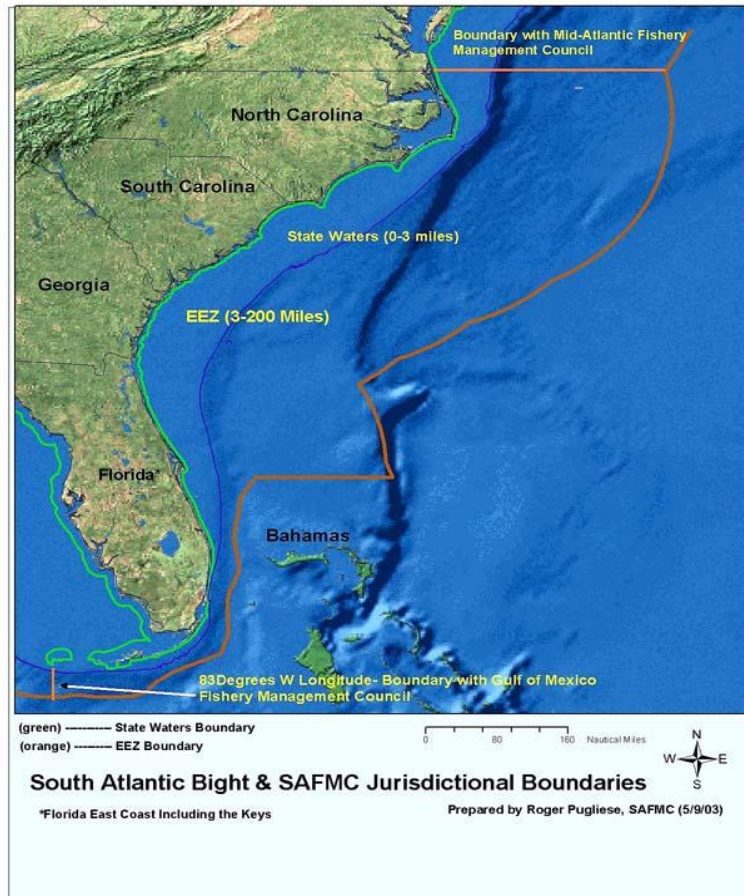


Figure.6 South Atlantic Fisheries Management Council Jurisdictional Boundaries
Source: South Atlantic Fisheries Management Council (2003)

In 1996 an amendment to the Magnuson-Stevens Act was put into law and named the Sustainable Fisheries Act. Although this amendment did not change or add to any of the social impact language it did reinforce the necessity for an EIS and its SIA counterpart. More recently, the Magnuson-Stevens Fisheries Conservation and Management Reauthorization Act was passed in 2006. This new law authorized the use of limited access privilege programs or LAPP's as well as mandated annual catch limits (ACL's) amongst other accountability measures. These landmark mandates have opened new realms possibilities through innovative uses of LAPP's. These programs are commonly called individual fishing quota (IFQ), individual transferable

quota (ITQ), catch shares, or community quota. These are programs that issue federal permit to catch a quantity of fish that represent a portion of the total allowable catch of a fishery. The important distinction of a LAPP is that the permits may be issued to an individual, community, or regional fishing association. Currently, North Carolina does not officially have any LAPP in place.

Lastly, the final piece of the governance mosaic that is incorporated in any North Carolina based fishery is the North Carolina Division of Marine Fisheries (NCDMF) responsible for the states marine and estuarine resources in waters extending out to three miles. Within NCDMF lies the Marine Fisheries Commission (MFC) consisting of nine members charged with authorizing FMP's for fisheries within state jurisdiction following the 1997 Fisheries Reform Act (FRA). The FRA also established a requirement for a socio-economic section of every FMP that presented social and economic data for each area affected. The NCDMF has carried out socio-economic research on North Carolina commercial fisheries for the past nine years and aims to re-assess each area every five years. Data from these social and economic analyses include interview and survey results as well as quantitative economic data. However, an in-depth investigation into the potential social impacts of a LAPP in North Carolina in general has not been formally explored nor have the social implications of a possible snapper-grouper LAPP. The latest report on the snapper-grouper complex in North Carolina was released in 2004 by NCDMF and dealt primarily with economic trends rather than impacts to a community's social structure. Nor did it address the area's previous social and political histories.

Users

The stakeholders involved in the social welfare of fishing communities in this North Carolina snapper-grouper case study can be broken down into four main categories: the commercial fishing sector, the tourism industry including coastal developers (also includes outsiders to the area seeking a leisure lifestyle and the tourism industry), the conservation community largely represented by environmental non-governmental organizations (NGO's), and finally the recreational fishing community. Specifically five communities outlined by SAFMC as snapper-grouper communities were included for this case study: Hatteras, Beaufort/Morehead City, Snead's Ferry, Wilmington, and Southport (Cheuvront and Neal 2004).

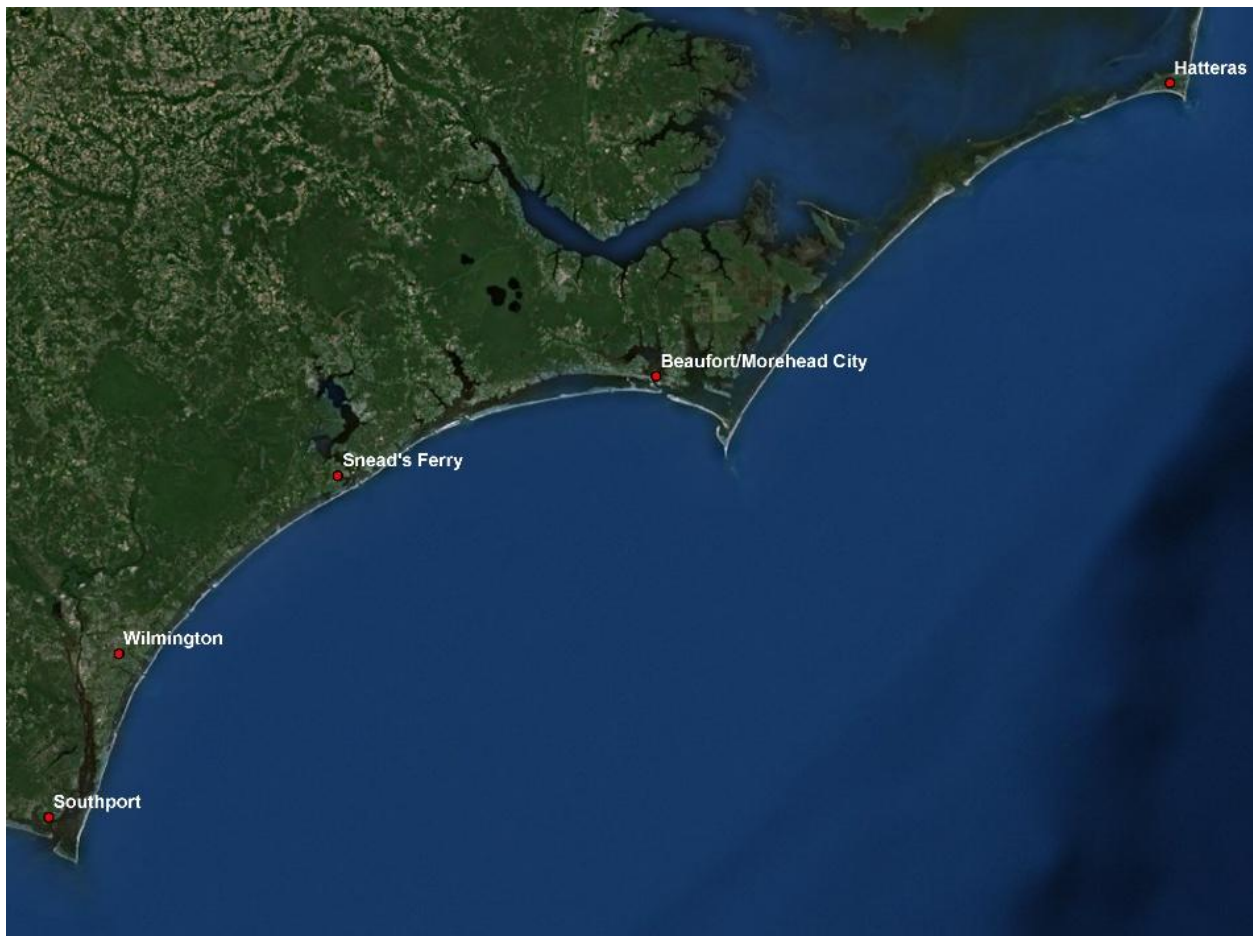


Figure.7 Snapper-Grouper Communities in North Carolina

The commercial fishing sector is a powerful force in any historic fishing community. With hundreds of years of fishing history, many members of the commercial fishing sectors are reluctant to change. However, with younger generations shifting away from commercial fishing many of these communities are finding an increased number of their youth leaving home in search of jobs (West and Garrity-Blake2003). The current economic situation in a majority of these commercial fishing dependent communities including dwindling employment opportunities have put immense pressures on the commercial fishing sectors.

On the other side of this network is the tourism and leisure seeking population that have added to the pressures of the commercial fishing sector by attracting large scale development projects. Along with this new influx of outsiders into these small, tight-knit communities there lies the potential for transformations to the values systems that used to characterize these communities. In addition to the tourism and leisure industry, the recreational fishing sector has not only strengthened the desire for coastal development but it has gone a step closer to infringing on what used to be strictly the domain of commercial fishermen. "Rod and reelers" as they are often referred to, have evolved into a multi-million dollar sports fishing industry. In North Carolina, tensions have continued to flare between the recreational and commercial fishing sectors as groups such as the Coastal Conservation Association (CCA) have begun pressuring state representatives to establish game fish status to species such as the red drum, the state fish of North Carolina. This status would close the fishery to all commercial fishing but allow recreational fishing to continue in controlled

quantities. Using the guise of conservation as one of their main tactics, the CCA exemplifies the additional dimensions that the recreational fishing sector adds to the picture.

Finally, environmental NGO's have taken a large role in determining the fate of fishing communities. With conservation as their main focus, groups such as the Environmental Defense Fund (EDF) and the Ocean Conservancy (OC) have had varying levels of influence throughout the evolution of fisheries management. They have been responsible for lobbying for the appointment of new council members to the development and implementation of catch share systems or LAPP's. In many ways, these organizations have acted as liaisons between the conservation minded public and formal fisheries management institutions. Although they have historically supported pure conservation, many of these groups are proposing new economically focused programs that have opened the door for analysis of socio-economic conditions, histories, and impacts. This shift in outlook is necessary for all sustainable management projects and has proven to be a pivotal step in successful community management.

In North Carolina an initial attempt to implement a snapper-grouper LAPP was met with general resistance by the MFC and many of the local commercial fishing communities. Alternative management strategies (a number of which have been widely used already in the snapper-grouper fishery) were suggested including area closures. And while a majority of the federal snapper-grouper permits are currently issued in the southern portion of the state; the 2004 NCDMF report on snapper-grouper revealed that there were many fishers fishing without the necessary license indicating that further studies into the patterns of snapper-grouper fishers in North Carolina are necessary. Also, this suggestion of non-compliance of formal

governance rules indicates areas of potential informal rule structures that should be investigated further.

Although working for communities in fisheries management can be a long and arduous process that some scholars believe is not appropriately suited for fisheries managers to do, there have been successful cases to learn from. Implementing institutional analysis such as adopting an IAD framework can reveal embedded power structures and aid in creating well informed policy. The process of integrating this type of framework was tedious but incredibly valuable for depiction of the multiple layers of social processes involved in North Carolina snapper-grouper communities. If applied to other communities prior to implementation of catch shares programs or other new management regimes, this framework could point out important characteristics of a community's rule making process that could ultimately be incorporated into a more cohesive, appropriate plan.

Recommendations and Conclusion

This study revealed many insightful platforms for further study as well as objectives for policy makers, scientists and NGO's to consider. In the case of implementing more social science based policy, there is a need for policy makers and fishing communities alike to view policy proposals such as catch share programs, as experiments rather than an ultimate solution. (Ostrom 1999). Accordingly, the best information that fisheries biologists, managers, and social scientists can do is "based on more or less informed expectations about potential outcomes and the distribution of these outcomes for participants across time and space (Ostrom 1999)." Similarly, the steps leading to dramatic management policies should offer enough time to allow communities and fisheries time to adapt but also to learn from mistakes or unexpected

outcomes. “Humans are capable of solving complex problems through trial and error, learned social norms and behaviors and reciprocity (Ostrom, 1999).” Resultantly, the rate of change that occurs as a result of a catch share program is an important variable that can affect the performance and success of a management policy over time and space. If change occurs too quickly, there is less opportunity for learning from policy experiments before another policy is quickly implemented (Ostrom 1999). Another suggestion for involving community in management that is helpful for all levels of rule making is to cultivate open channels of communication.

Through opening avenues for increased communication and community involvement in management process, not only would managers and policy makers develop a better understanding of the embedded social processes of a community but they would also address the extremely significant community characteristic of trust and reciprocity. Developing and maintaining systems of trust and reciprocity such increased self monitoring by community members are critical for management policy success (Ostrom 1999). One method for increasing trust and reciprocity in addition to opening forums for communication between policy makers, managers, and community members is to implement participatory techniques. “Resident action research teams” are a method for increasing interactions between researchers and local participants that can include compiling written records of local ecological history and science (Rocheleau 1999). An important way to increase reciprocity is to include a higher proportion of participants who are well known in the community, have a long term stake in that community, and find it costly to have their reputation for trustworthiness harmed in that community

(Ostrom 1999). Hence the composition of the fishing community members is important for building trust and reciprocity.

The next recommendation is built from Ostrom's theories of building polycentric governance systems (Ostrom 1999). Polycentric government systems as their name suggests do not centralize power at their core because of their complex nature, they are endlessly adapting to new situations (Ostrom 1999). A polycentric governance system can be defined as "a system where citizens are able to organize not just one but multiple governing authorities at differing scales (Ostrom 1999)."

"We need to recognize that governance is frequently an adaptive process involving multiple actors at diverse levels. Such systems look terribly messy and are hard to understand. The scholars' love of tidiness must be resisted. Instead, we need to develop better theories of complex adaptive systems, particularly those that have proved themselves able to utilize renewable natural resources sustainably over time. (Ostrom, 1999)."

Corresponding with polycentric governance systems, Ostrom's idea of complex adaptive systems can be advantageous for fisheries managers and policy makers to understand. These types of systems are composed of a many active elements that are characterized by a highly complex pattern of interactions. These systems produce "emergent properties that are not easy to predict by analyzing the separate parts of the system (Ostrom 1999)." In general, complex adaptive systems demonstrate "coherence under change, via conditional action and anticipation, and they do so without central direction (Ostrom 1999)." As a result, building resilience becomes embedded into the system and ideally becomes strengthened over time.

In terms of catch share systems, this investigation supports the theory that if applied as a “rule changing technique to improve the structure of the commons dilemma,” catch shares are a potential part of a larger solution for healthy communities and fish stocks (Ostrom 1999). The process of applying catch shares as rule changing vehicles will require patience and time. It may also necessitate devolution of power from regional and state level down to the community level that in many places could signal a dramatic shift in current power structures. In North Carolina, incorporation only down to the county level has been problematic especially in fishing communities with rich, cultural identities including the five snapper-grouper communities analyzed for this investigation.

Human ecology is loosely defined as a discipline that studies the relationships of humans, human societies with their natural, social and created environments (Borden 2008). On a fundamental level this paper has focused on this very aspect of fisheries management and the need for more of this type of research. In total, the current formal policies in place for addressing social impacts of past, present and future fisheries management plans such as LAPP’s are adequate as they are. However, they are grossly underutilized. The root of this issue lies in the need for more social science research at all levels of the governance mosaic as well as a general acceptance of social science as an integral part of fisheries management. Given the complex social matrices inherent in a common-pool resource like fisheries, continuing to ignore the social contexts from which they are born defies all reason and logic. Although the importance of social science analysis has begun to gain acceptance from policy makers and fisheries managers, questions still endure. By denying the importance and existence of the tightly coupled social ecological relationships, not only can this lead to policy makers imposing

unsuccessful management regulations but also put the health of the environment at risk. “The effect of human action on the environment has a long time delay (Ostrom, 1999).”

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