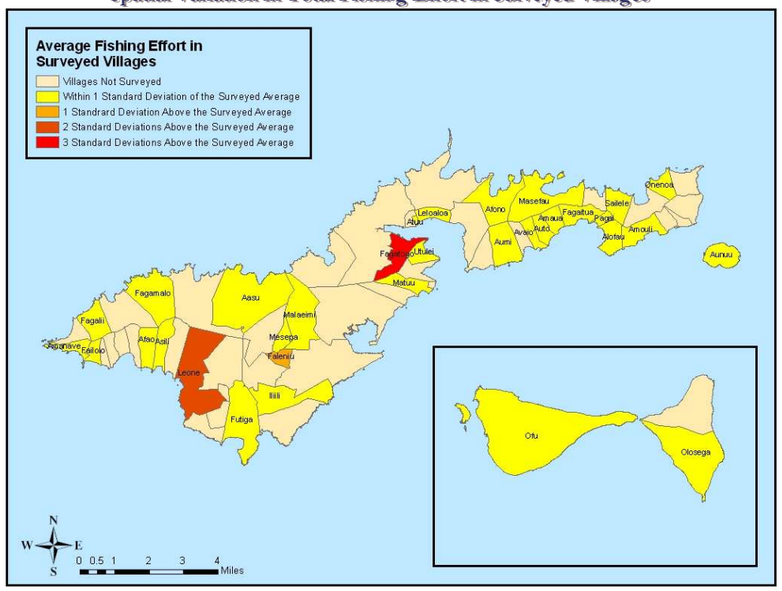
Geographic Prioritization

In this policy area we analyzed our data by exploring the variation in each policy area across villages. We also incorporated biophysical characteristics into the analysis in order to present ways for managers to integrate the socioeconomic aspects of fisheries management into their decision processes.

Spatial Variation in Total Fishing Effort in Surveyed Villages



To show variation in socioeconomic and biophysical traits between villages, we used GIS to create maps of American Samoa that show each of the villages surveyed. Each individual map focuses on a possible area of concern for fishery managers and indicates how each surveyed village compares to the average value. Examples of the areas of concern that we mapped are habitat complexity, population density, agreement with regulations, and total fishing effort. The latter is shown in the figure above. In all, 11 maps were made that cover a range of fishery concerns involving fishery resource potential, population related pressures, and sociological information. These categories correspond to the quality of the fishery, the amount of resource exploitation, and the general perceptions of residents regarding different types of management actions.

Managers can use results from our model to estimate the effects of future management actions on individual villages, appraise the success of specific policies on specific villages, assess how villages may be affected by the activities of other villages, and predict the effects of territory-wide trends based on the current spatial variability. Additionally, managers can examine either the variability of a specific management concern across all villages, or they can distinguish the interactions of different management actions within villages.

Conclusions

Our research provides valuable information regarding socioeconomic aspects of near shore coral reef fisheries management in American Samoa. It highlights current conditions and explains significant influences in fishery use, education, and regulatory perceptions. Moreover, it proposes a spatially explicit model of resource availability, resource use, and sociological concerns. Finally, it presents a conceptual representation of how this information fits into the broader scope of fisheries policy development. By analyzing the sociological component of fisheries in American Samoa, this research provides beneficial decision support for fisheries managers. While the findings of this report are important, they must still be balanced with other available information regarding the coral reef resources in American Samoa. This research should enhance the knowledge of local resource managers and allow them to make more informed decisions toward the fisheries.

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[i] Green, A. *Status of coral reefs on the main volcanic islands of American Samoa: a resurvey on long-term monitoring sites.* (American Samoa, Department of Marine and Wildlife Resources, 2002).

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[iii] Skelton, P. A., et al. *The Status of Coral Reefs and Marine Resources of Samoa.* (2000)

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GROUP PROJECT BRIEF

DECISION SUPPORT FOR CORAL REEF FISHERIES MANAGEMENT: COMMUNITY INPUT AS A MEANS OF INFORMING POLICY IN AMERICAN SAMOA

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ON THE WEB AT HTTP://WWW.BREN.UCSB.EDU SPRING 2006

Introduction

Over the past two decades reef fish and invertebrates have declined in both abundance and size in American Samoa.[i] To address this decline, the Coral Reef Advisory Group (CRAG) was developed, linking territorial agencies to facilitate coral reef management in American Samoa. CRAG identified four areas of concern: overfishing, land-based pollution, overpopulation, and global climate change and designed Local Action Strategies (LAS) to support the management of these problems. The Department of Marine Wildlife and Resources (DMWR) is the lead agency in the development of the overfishing LAS with a mission of "restoring fish stocks and other exploited biota that are commercially, ecologically, and culturally important to the American Samoan way of life (*fa'a samoa*) and to prevent non-sustainable harvesting methods"[ii]. Our study addresses the overfishing LAS by creating a decision support tool for DMWR based on socioeconomic and geographic data.

Background

American Samoa is a U.S. Territory located in the South Pacific, approximately 2,600 miles southwest of Hawaii. The territory encompasses five volcanic islands and two coral atolls within the Samoan archipelago. Coral reefs extend approximately 2 to 3 miles offshore and provide habitat for as many as 850 species of reef fish.[iii] Historically, fishing has been an important part of the American Samoan way of life and remains so today.

Objectives

The intent of our study is to use data and statistics derived from community surveys to support future fishery management decisions of DMWR. In particular, our research compiles and analyzes public perceptions and opinions in order to identify management concerns. Incorporation of socioeconomic factors in fishery management decisions is recognized as an important aspect of effective policy development.[iv] In order to focus management strategies, we identified three policy themes.

Policy Themes Addressed by Our Research

Regulation

- **What is the current perception of fishery regulation?**
- **With which types of regulations are people most likely to comply?**
- **What are the factors that influence people's agreement level with regulations?**
- **Is there a difference of opinion between user groups regarding attitudes and opinions towards fishery regulations and management policies?**
- **What spatial level of management is most preferred?**

Education

- **Where do American Samoans currently receive most of their coral reef fishery education?**
- **Specifically, from which sources and how frequently do user groups receive fishery education?**

Geographic Prioritization

- **How can DMWR incorporate spatial variation in demographic and environmental factors in order to enhance fishery management strategies?**

Methods

Our analysis incorporates data from community surveys, local knowledge, collaboration with experts, and spatial models to provide local resource mangers with a decision support tool to aid in the

implementation of sustainable fishery management strategies.

We developed a community survey in collaboration with local managers to address various factors concerning fishery use and management. We asked specific questions about demand for fish, community attitudes towards fishing regulations, and community preferences towards fishery resources. Our objective was to examine general trends in survey responses to draw conclusions based upon our analysis.

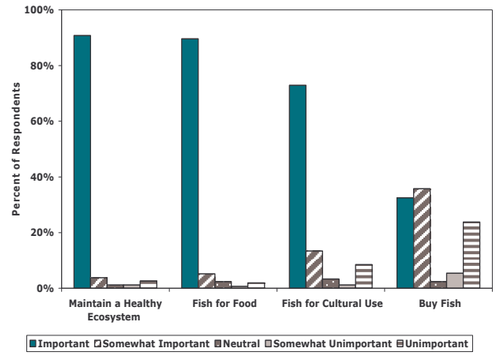
Over an 8 week period in the summer of 2005 we surveyed a cross section of villages in American Samoa. We used a stratified sampling technique that was aimed at capturing the average community member by representing the varying degrees of urbanization, geographical isolation, and access to coral reef fishing grounds. From this random sampling, 34 villages across the territory were selected to survey. The villages were urban and rural, coastal and inland, and in both remote and well-serviced locations throughout the Territory. With the aid of local Samoan translators, we administered a total of 425 surveys in English or Samoan. We conducted at least 12 surveys in each village. To analyze our data, we used a variety of statistical methods, including summary statistics, analysis of variance tests (ANOVA), chi-squared tests, and multivariate regression analysis. A regression analysis determines the factors which potentially influence a response to a question by evaluating each variable while holding all other factors constant.

Results and Discussion

Fishery Use

One of the aims of our survey was to provide DMWR with information about the frequency of different uses of the fishery as well as data concerning community fish and invertebrate preferences. To support a bottom-up approach, we elicited community opinions about which uses of the fishery respondents perceived as important. As seen in following figure, the vast majority of survey respondents felt that maintaining a healthy ecosystem and fishing for food were important uses of the fishery. A substantial majority also felt cultural use of the fishery was important, while commercial use of the fishery (buying and selling) and recreational fishing were considered somewhat less important.

Respondent Opinions on the Importance of the Near Shore Fishery

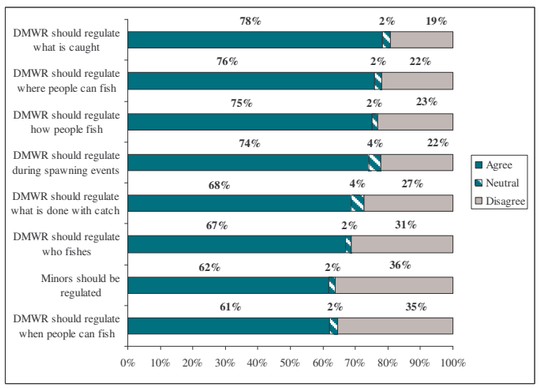


Regulation

To maximize effectiveness of management, stakeholder perceptions, attitudes, and experiences regarding regulations should be considered while formulating solutions to fishery management problems. Built into the context of regulatory regimes, identification of user groups and their agreement levels with management strategies can assist in promoting compliance.

To evaluate the types of regulations which will have the highest level of compliance in the future, we asked village members to categorize their level of agreement with eight different statements regarding potential regulation types. In general, the response is in favor of each of the eight regulation types, with at least 61% of respondents in agreement with each regulation as seen in the figure below.

Percentage Level of Agreement with Regulation Type



Based upon this initial analysis, compliance is estimated to be greatest with the following four regulation types:

"DMWR should regulate what is caught"

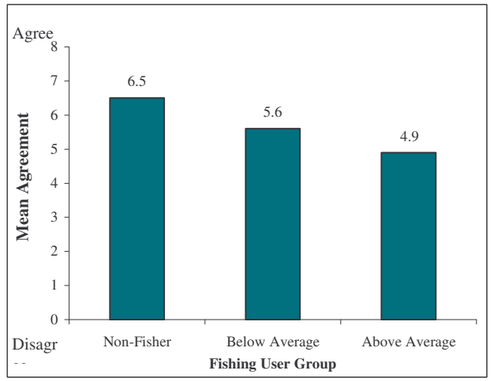
"DMWR should regulate where people fish"

"DMWR should regulate how people fish"

"DMWR should regulate during spawning events"

User group perceptions about current and proposed regulation strategies can also provide valuable insight for managers in the development of a community-driven management framework. For example, the figure below shows that above average fishers are least likely to agree with regulation. Therefore, it is important for fishery managers to collaborate with fishers when determining the regulation strategies that will receive the greatest level of compliance.

Mean Agreement Level with Regulations among Fishing User Groups



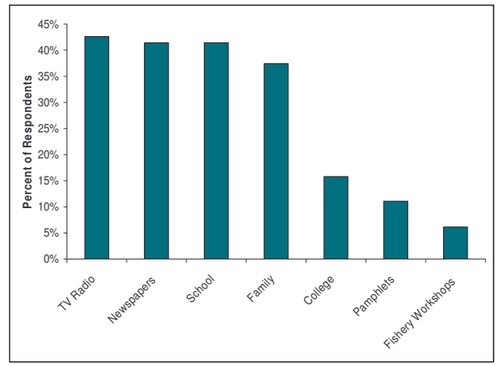
Our initial analysis also examined the perception of current regulations and enforcement strictness. Forty-six percent of the respondents think current regulations are too lenient, while only 8% expressed that they are too strict.

Education

Well conceived and adaptive public education programs are an integral component in maintaining fishery resources. They can promote sustainable use of the resource base and teach people to become stewards of their surrounding environment. Education and outreach can also be a way to establish a working connection between managers and the community.

Based on our survey, the most frequently accessed fishery education sources (those with a frequency of most days) are TV and Radio (with 43% respondents), newspapers (41%), and school (41%). Family, as a source of fishery education, is also a frequently used source, with 37% of the respondents receiving this source most days, as seen in the figure below.

Percent of Respondents Receiving Fishery Education Most Days



In our analysis, we also used regressions to determine factors that affect the frequency of fishery education from media, social, and workshop sources. The statistically significant variables in the regression on social education were age, gender, and curfew. These results are notable because the regulation regressions indicated that people with more social education are more likely to disagree with regulations, but people who attend workshops are more likely to agree with regulations. Therefore, if American Samoa chooses to increase regulations and enforcement as a management tool, then the nature of social education will need refining in order for those tools to be more accepted. Workshops targeting the sources of social education (heads of families and village leaders) could be a means of influencing social education.

Both the summary statistics and regressions for the education policy area indicate that media education is not received significantly more by any particular demographic group. Therefore, media sources might be an efficient means of disseminating fishery information to the general public. Media sources are also currently the means by which fishery education is received most frequently. However, our research did not address the quality or effectiveness of any of the education sources. Therefore, if media sources of fishery education continue to be used frequently, careful consideration needs to go into the type of information distributed.