

博士論文（要約）

Inland Fisheries Management in Argentina: An Institutional Approach toward Sustainable Development

（アルゼンチンにおける内水面漁業管理：
持続可能な開発のための新制度論的アプローチ）

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Abbreviations

AAPM	Asociación Argentina de Pesca con Mosca
APCNH	Asociación de Pesca y Caza Nahuel Huapi
CEAN	Centro de Ecología Aplicada de Neuquén
CPRs	Common Pool Resources
CPUE	Catch per Unit Effort
EEZ	Exclusive Economic Zone
EHC	Estación Hidrobiológica de Chascomús
EMPROTUR	Ente Mixto de Promoción Turística de Bariloche
FAO	Food and Agriculture Organization
FEMEPYL	Federación Metropolitana de Pesca y Lanzamiento
FEPYLBA	Federación de Pesca y Lanzamiento de la Provincia de Buenos Aires
FEPYLGRABA	Federación de Pesca y Lanzamiento del Gran Buenos Aires
INDEC	Instituto Nacional de Estadística y Censos
JICA	Japan International Cooperation Agency
MEA	Millennium Ecosystem Assessment
NGOs	Non-Governmental Organizations
RFMO	Regional Fisheries Management Organization
SDGs	Sustainable Development Goals
SENASA	Servicio Nacional de Sanidad y Calidad Agroalimentaria
UNCLOS	United Nations Conference on the Law of the Sea
UNDP	United Nations Development Programme
WCED	World Commission on Environment and Development

Prescript

Fisheries and aquaculture have played an important role in providing global food security and income to people relying on this sector. It is estimated that fish consumption per capita has increased in developing and developed countries [FAO, 2016:2], and over 56 million people worldwide were engaged in capture fisheries and aquaculture activities in 2014 [FAO, 2016:5]. Thus, fisheries and aquaculture have become crucial contributors not only to regional socio-economic development but also to the livelihood of fishing communities.

However, world capture fisheries, primarily marine capture fisheries have declined or remained stagnant in many parts of the world [FAO, 2016:3-4], and inland water captures are also severely threatened [Harrison and Stiassny, 1999; Post *et al.*, 2002; Welcomme *et al.*, 2014:iv]. Capture declines could be attributed to the overexploitation and depletion of aquatic resources [FAO, 2010a:42; FAO, 2014:7]. In contrast to the stagnation of capture fisheries, aquaculture production has grown rapidly since the 1980s with the introduction of new farming technologies and innovation systems. The trends in this sector indicate that it will continue growing to meet the increasing demand for fish commodities [FAO, 2010b:3-5].

In Latin America, aquaculture production began to develop since the 1970s and this region became one of the main producers in the world [FAO, 2010a:6; FAO, 2014:20]. The major contributors to the growth have been Chile, Brazil, Ecuador, and Mexico in order of importance by production volume from 2006 to 2008 [Wurmann, 2012:11]. In particular, Chile has shown a sustained growth in salmon farming production, competing at the global level with Norway. The development of the salmon farming industry in Chile started at the end of the 1960s under the technical and financial cooperation project granted by the government of Japan and evolved rapidly after the 1980s owing to increasing international demand [Hosono, 2010]. In view of the successful results, aquaculture development programs were expanded in other Latin American countries, such as Bolivia [JICA, 1992; Hamamitsu *et al.*, 1998] and Argentina [Uez, 1995; Nagasawa, 1997:25-32].

The inadequate development programs and the lack of a regulatory and enforcement framework can negatively affect the sustainable fish production and will have an adverse effect on the environment in the long run. The central governments may facilitate the development of aquaculture projects, but as stated by Smith and Peterson, adequate background research on socioeconomic, cultural, traditional, legislative, and technical factors of the region in which fish farming is to be introduced is crucial to avoid pitfalls [Smith and Peterson, 1982:1-9]. Martínez-Espinosa and Barg add that the environmental, scientific, political, and institutional factors should also be considered in aquaculture development planning, particularly for those projects that have strong governmental intervention [Martínez-Espinoza and Barg, 1993:42].

Based on the importance of aquaculture development, our previous research has focused on the aquaculture projects implemented in some Latin American countries. It was found that several factors, including resource use patterns, and government and private sector collaboration affected the development of fish farming projects. Although the salmon industry in Chile has shown a sustained growth, except for periods of virus outbreaks, the development of trout farming in Bolivia has contributed to the promotion of local production. In Argentina, an attempt was made to promote intensive salmonid farming; however, it did not prosper as in Chile because of the lack of demand and inadequate commitment of stakeholders [Luchini and Huidobro, 2008] at the national level. The fish farming programs have contributed to promoting recreational fisheries in Argentina [JICA, 2009; Wegrzyn and Ortubay, 2009:290-300]. Recreational fishing is generally regarded as a leisure activity of the wealthy upper or middle classes, however, it represents an important social pastime and a source of food to the local popular sector in many developing countries, including Argentina. However, the effects that this segment can generate in terms of conservation issues have not been focused on in previous studies.

Cooke and Cowx assert that even though it is largely commercial fisheries that are criticized for overexploiting aquatic resources, recreational fisheries can also alter the fish population. They argue that the latter has fewer access restrictions, catches are not completely reflected on fish landings reports, and the governments usually disregard its effects on fish stocks [Cooke and Cowx, 2006]. Therefore, institutional factors should be included in designing and improving the recreational fishing schemes.

Recreational fishing has grown substantially in Argentina. Its management and conservation policies have been based on a top down regime, but this type of system can generate adverse effects in the use of resources and degrade the environment. As Anderson Jr. stated, when the central authorities impose the rules that are not congruent with the local needs, the management of resources may fail to affect economic returns [Anderson Jr., 1987:327-334]. Therefore, in view of the importance of resource management and conservation, the present research was intended to focus on inland recreational fishing in Argentina, underscoring the implications of communication and cooperation among stakeholders to sustain this activity in the long term. The inland fisheries were selected because they have been the focus of few studies compared with marine fisheries. It was not the intent to measure the fish population to define an appropriate management model, rather the objective was to demonstrate how fisheries regulations of the government can improve the use of common pool resources (CPRs) at the local and regional level.

Preface

Background of the research

The trends in world capture fisheries and aquaculture indicate that the appropriate formulation of resource management is crucial to sustaining the use of water common-pool resources (CPRs). Internationally, cooperation and agreements among the countries have led to the regulation of the catches, such as that of tuna stock in the high seas [Japan's Fisheries Agency, 2009]. Although the top down regimes still predominate domestically, the governments and local fishermen have at times been successful in developing alliances to conserve resources, as occurred with lobster production in Maine [Acheson, 1975; Ostrom, 2008:12]. Inland fisheries can also function under the co-management regime involving local fishers in decision making, as occurred for Victoria Lake and the establishment of Beach Management Units (BMUs) [Welcomme *et al.*, 2014:67]. Even though one of the most common users of inland waters are commercial and recreational fishers, the impacts of the latter on the resource system have been largely unnoticed or not reflected in global catches. Thus, Cooke and Cowx suggest that the effect of recreational fishing on fish stocks should not be overlooked [Cooke and Cowx, 2006:94-95].

However, although recreational fishing is an extractive activity, Pitcher states that it has the potential to reconcile the use of living aquatic resources with conservation. He argues that catch-and-release and participation in habitat restoration may help to conserve the fish populations [Pitcher and Hollingworth, 2002:xii]. Furthermore, Granek *et al.* attest that recreational fishers may contribute to the conservation of fish resources when involved in the development of fishing regulations [Granek *et al.*, 2008:1127]. Cooke *et al.* state that formal institutions or regulations imposed by the centralized governments can be complemented by informal institutions (or voluntary rules and habits) with the aim of conserving common resources [Cooke *et al.*, 2013:439]. Therefore, the informal institutions and the involvement or participation of local anglers in the design of fishing regulations can help to achieve management goals.

Attempts to promote recreational fisheries in Argentina began with the introduction of exotic salmonids species into the inland waters of the northern Patagonia region in the early 1900s [Wegryn and Ortubay, 2009:24]. The pristine water conditions have led to the survival of trout and salmon species, enabling the expansion of recreational fishing in the region. It is estimated that periodical salmonid farming and restocking programs have contributed to maintaining the population since its introduction [Macchi, 2004; Macchi *et al.* 2008]. In terms of fishing regulations, the inland water resources of the Patagonian region have been managed under uniform and standardized fishing rules crafted by the member provinces and implemented through local stakeholders on consultation. However, the fisheries resource management and conservation

in the Pampas region, located in the eastern central part of the country, are held primarily under the direction of the central government. As a result, the institutional framework and the enforcement system have remained weak and inefficient [Baigún and Delfino, 2001:136-137; Grosman, 2001:187]. Inland recreational fishing is a popular and economically important activity in the region that not only provides an informal social space, but is also a source of food to some local fishers.

Linking human security to recreational fisheries

The concept of human security began to expand internationally after the report of the United Nations Development Programme (UNDP) addressed the new global crisis in the 1990s. The report predicted that the end of the Cold War and the progress of the globalization combined with the liberalization of the economy and information technology expose the world to new influences that may threaten humanity. The narrow and traditional interpretation of the security linked to territorial protection and political interests should be changed to integrated security of the livelihood and dignity of human beings. The document emphasized the need to confront the threats that affect economic, food, and environmental securities [UNDP 1994]. The Commission on Human Security establishes that human security complements the traditional state security, and defined it as the protection of “the vital core of all human lives ...”, pointing out the need to create political, social, environmental, and other systems safeguarding people’s lives [Commission on Human Security 2003:2-4].

As earlier mentioned, recreational fisheries are widely regarded as a leisure activity. However, the food security component and its implications for local people are often overlooked. In Argentina, recreational fishing is a popular activity that not only provides an important social space that enables the interaction and communication between the anglers and their families or friends, but also contributes to food security. The contribution to food security is related to the chronic national economic instability. Recreational fishing helps to bring food to the home, reducing the economic burden of resource-poor local households. In terms of environmental conservation, unlike commercial fisheries, recreational fisheries can contribute to preserving the aquatic resources. The human dimension of recreational fisheries matters since it can enhance the management and conservation outcomes, including the practice of catch-and-release, voluntary informal rules, and the participation of anglers in fishing management programs. Moreover, it helps to promote local or regional tourism and reinforces local communities.

Conceptual framework of sustainable development

Although concerns over sustainability date back to Malthus¹ and Meadows², the concept of sustainable development evolved [Drexhage and Murphy, 2010:7] when the world's political leaders began to debate issues concerning environment and development at the global scale in the United Nations Conference on the Human Environment in Stockholm, Sweden since 1972. This conference led to the establishment of a series of principles and recommendations in an effort to promote development while keeping environmental issues in mind [United Nations, 1973:3]. In 1987, the concept was officially recognized in the Brundtland Report³ defining sustainable development as the development that “meets the needs of the present without compromising the ability of future generations to meet their own needs” [WCED, 1987:8]. In 1992, the Brundtland model of sustainable development was internationally endorsed at the Rio Earth Summit (UN Conference on Environment and Development held in Rio de Janeiro, Brazil), adopting the principles and the agenda 21 for sustainable development. Since then, the concept has become one of the guiding principles in international politics. Although the term sustainable development has been criticized as ambiguous and inconsistent in its use [Baker *et al*, 1997:5; Sachs, 1999:25], it is internationally recognized that the concept intends to integrate environmental considerations into socio-economic development programs [Baker, 2006:7].

Recently, the Sustainable Development Goals (SDGs) have been set up as part of the post-2015 development agenda [The Report of the High-Level Panel of Eminent Persons on the Post-2015 Development Agenda, 2013:1-6], containing 17 goals and 169 targets. Although it is argued that the implementation of sustainable development might be difficult because of its broad scope, the flexibility of its principles and objectives facilitate adaptation of the concept according to the stakeholders' purposes and interests [Lafferty and Meadowcroft, 2000:14; Drexhage and Murphy, 2010:9]. Moreover, the multiple goals and targets enable governments and NGOs to combine tasks instead of focusing on one particular objective.

Literally, sustainable development simply refers to the development that continues over time [Elliot, 2006:9; Lélé, 1991:608-609]. However, this new paradigm entails an integrated view of development in which not merely a long term economic output is to be attained, but also other aspects such as social and ecological components are important. The conventional idea of development dates back to the postwar initiatives in restoring devastated economies and assisting

¹ In issues related to overpopulation and agricultural production limits.

² The reunion of the Club of Rome to address the problems of the human kind including the natural resources and pollution issues.

³ Brundtland Report refers to the outcome document ‘*Our Common Future*’ of the World Commission on Environment and Development headed by the then Prime Minister of Norway, Gro Harlem Brundtland.

poor former colonies and agricultural countries through infrastructure projects [Sachs, 1999:28; Ostrom *et al.*, 1993:1-3]. Initially, development was equated with economic growth that would percolate into social basic needs [Sachs, 1999:28]. However, this neoclassical focus had adverse consequences on the environment and society, including air pollution, overexploitation of natural resources, higher unemployment, and social inequalities [Salim, 2007:25-26]. Then, the international community took the initiative to formulate the strategies addressing environmental and social problems.

The World Commission on Environment and Development (WCED) in its seminal work, *Our Common Future* emphasizes the need to limit the use of environmental resources. It also focuses on social equality, such that the natural resources are accessible to everyone, including the impoverished people, being a duty and responsibility of political authorities to empower citizens in decision makings [WCED, 1987:8-9]. Therefore, sustainable development has become an international commitment, and governments are bound to establish a participatory program that helps to limit the realm of bureaucracy and authoritarian solution.

Lélé points out that initially, the concept of sustainability was used in relation to the renewable resource systems [Lélé, 1991:609]. In fisheries, the concept of *sustainable yield* (the annual catch level that can be maintained over the years) emerged to sustain fish harvests into the future, focusing primarily on the physical output, such as the amount landed for consumption [Charles, 2001:185]. Lélé contends that from that concept, the term ecological sustainability was derived. Ecological sustainability depends on the interaction between nature and the humans. The depletion of fish resources, for instance, may, on one hand, undermine the livelihood of fishing communities, but on the other hand, the depletion may occur due to the lack of knowledge or capabilities of fishers to conserve those resource units for future utilization [Lélé, 1991:609]. Thus, from her argument, it can be assumed that because of the crucial role of natural environment in people's livelihood, the society must find a means to achieve sustainable development by using the resources rationally.

Prospects of the commons

The report *Our Common Future* prepared by the WCED introduced an outline on how to address the challenges of sustainable development in several fields, including the global commons. Albeit it focused on the management of oceans resource systems, the Commission underscored the importance of enhancing the cooperation and agreements among the different states to work on management, development, and monitoring of the shared ecosystems and commons. It also stressed that states must jointly devise equitable and enforceable rules to govern the commons

based on the rights and duties of their countries so as to prevent environmental degradation for future generations [WCED, 1987:261]. However, these political proposals must be implied as per the needs of each country, including the states and the civil societies.

Ostrom quoted that William Clark stated that there was no improvement in programs intended to promote sustainable development, but the concept of sustainability has percolated into the development thinking within the international community. Moreover, she argued that the evaluations made by the Millennium Ecosystem Assessment (MEA) for 2001-2005 in terms of the ecosystem and its services in the world, indicated that while the economy grew substantially, there was a negative effect on the environment. In this regard, she stated that most of the problems related to the commons arise from the premise that standardized models lead to effective solutions. Generally, these standardized models are adopted by the central authorities without considering other local partners to govern the resource systems. Further, she stressed that environmental policies must be in accordance with the local cultures and institutions and that the performance should be monitored by governmental agencies and local users for sustainable use of common resources [Ostrom, 2008:10-11;17-18].

In the context of fisheries, the area of interest in this research, the Food and Agriculture Organization of the United Nations (FAO) defines sustainable development as the “management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment of continued satisfaction of human needs for present and future generations. Such sustainable development (in the agriculture, forestry and fisheries sectors) conserves land, water, plant and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable.” [FAO, 1989:65]. This definition involves the use of a scarce resource base through institutional systems to continuously fulfill human needs. After the adoption of this definition, in 1995, FAO published the “Code of Conduct for Responsible Fisheries” [FAO, 1995a] providing a series of principles to ensure a sustainable exploitation of the living aquatic resources.

Conservation is a broad concept used in several fields. In the area of natural resources, it is conceived not only as a protection or preservation, but also as a wise use or resource management [Tivy and O’Hare, 1981:190,196]. With respect to the latter, in relation to development, Sachs refers to conservation as “the efficient management of natural resources in order to optimize the yield of living resources, such as forests or fish stocks, by harvesting just as much as not to impair the rate of regeneration” [Sachs, 1997:72]. Because management and conservation involve the wise use of resources, the role of institutions is crucial to constraint the use promoting cooperation and coordination, which can lower monitoring, sanctioning, and

enforcement costs. As Ostrom contended, agreed upon rules devised by groups of individuals, sharing similar values, can be effective in sustaining the resource system in the long term [Ostrom, 1990]. In fisheries, the quantification of movable and migratory fish resources is difficult, particularly in countries lacking appropriate technologies and equipment for measurement. This study intends to examine resource management and conservation patterns in local settings, keeping in mind the backgrounds of fishing communities.

Dialogue and participation of local stakeholders in decision makings can prevent further conflicts and project pitfalls. Berkes and Farvar suggested that the development planners interested in exploiting the resources of a particular area should know how to deal with the existing social structures. For instance, they exemplified that a Japanese fishery resource system such as *iriai* may not be suitable to be introduced and implemented on coastal fisheries area of Thailand, though some fishing practices may be applied [Berkes and Farvar, 1989:13-14]. Future-oriented sustainable development programs should be held in congruence with local needs.

Purpose of the research

The present study aims to determine how management and conservation of inland fisheries can be sustained over time. It adopts an institutional approach in examining the governance of resource systems and its effects on local fisheries. As Berkes and Farvar have explained, the management of resource systems can function effectively as long as there exist institutions consistent with local and environmental settings [Berkes and Farvar, 1989:13]. That is, the institutions that can induce and motivate the actors to cooperate towards the rational use of common resources so that they are available or produced in the long term.

This study is focused on inland recreational fisheries management in Argentina and the institutions governing the common-pool resources (CPRs). It analyzes how the central government and local fisheries stakeholders interact and coordinate in conserving the resources and identifies the factors that contribute to achieve the sustainable development of inland fisheries. It also includes a comparative analysis of inland recreational and commercial fishing in two regions of the country. The role of the government is fundamental in defining the regulations to avoid overuse, depletion, and conflicts, but it must be backed by the local stakeholders. Therefore, this study assesses how the collaboration management can effectively function to sustainably conserve the fish resources.

Methodology of the research

In fisheries, the users interact with CPRs. Thus, the human actions and resource management determine how to conserve the available resources in the long term. To avoid overuse, there is a need to establish institutions that must be effective and consistent with the local needs and the environmental settings [Berkes and Farvar, 1989:13].

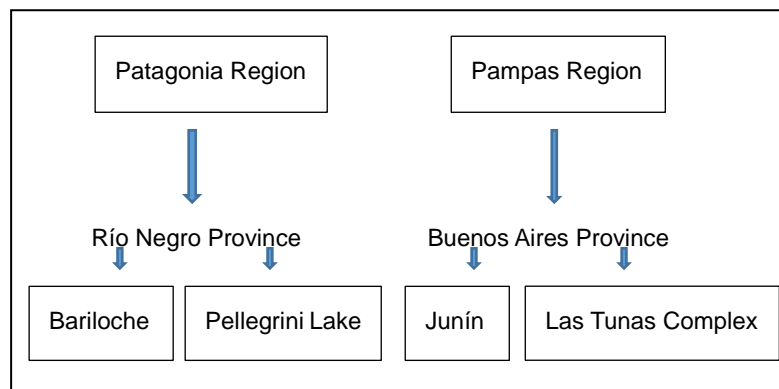
An important theoretical framework of institutions has been proposed by the late economist Douglas North, who analyzed transaction costs and enforcement processes in examining the relationship between institutions and the economic development. He suggested that institutions “are the humanly devised constraints that shape human interaction” and “reduce uncertainty by providing a structure to everyday life” [North 1990:3-4]. North explained that institutions consist of formal and informal constraints, and the first can complement the second, and lower transaction costs [North, 1991:46]. Therefore, his assumption establishes that the institutions can create order and incentives, and reduce uncertainties in human interactions.

Elinor Ostrom, a political scientist, who studied the implications of institutions in the management of CPRs in local and regional settings, stated that institutions are the set of working rules used to organize repetitive interactions [Ostrom 1990:51; Ostrom 1992; Ostrom 2005:3]. From the analysis of several case studies, she found that a group of individuals sharing common values can self-organize and devise their own rules to govern the commons for a long period of time. However, Ostrom argued that when governmental authorities give some rights to local users to organize and make decisions on resource use, the CPRs and the institutions tend to endure over the years [Ostrom 1990]. Furthermore, Ostrom *et al.* pointed out that the government agencies can act as a facilitator by providing locally non-available information and helping to enforce commitments [Ostrom *et al.* 1999:281]. In this dissertation, earlier concepts of sustainable development were outlined.

The present study was based on the theoretical postures of North and Ostrom. In particular, it uses the institutional approach of Ostrom as a reference in examining several case studies to identify the inland fisheries management and conservation regimes that have been successful or failed to function over the years. This study analyzed how the sets of rules have been crafted to organize fishing activities on the local and regional basis. The degree of governmental intervention in the management and enforcement systems and the participation of the users in decision makings were also examined to determine the role of national authorities. In this way, we can understand how coordination and cooperation or their absence affected the management and conservation of CPRs in Argentina.

Empirically, the management and institutional framework of inland recreational and commercial fisheries of two regions of Argentina were examined (**Figure 1**). The first was the Patagonia region located in the southern area, and the second was the Pampas region covering the central eastern part of the country. We studied how the inland recreational fishing rules have been devised in both the regions and analyzed the current fisheries management regimes.

Figure 1. Case Studies



The Patagonia region includes the case study of the Río Negro Province, to assess how the central and local governments, as well as social groups of different backgrounds, have managed the inland recreational fisheries to conserve the salmonids species. It involved a non-profit recreational fishery organization, located in the Bariloche Department, to apply the theory of Ostrom *et al.* (1999) with respect to the role of the government. Then, the inland artisanal commercial fishing on Pellegrini Lake, located in General Roca Department was examined as a comparative case.

For the Pampas region, the case of inland recreational and artisanal commercial fishing of native pejerrey species, which predominate in the shallow lakes of Buenos Aires Province, was studied. Furthermore, the unique history of inland artisanal commercial fisheries of the Las Tunas Shallow Lake complex, located in Trenque Lauquen Department, was examined. Inland recreational angling of Laguna Gómez Shallow Lake, located in Junín Department was also studied as an area recovering from depletion.

The author conducted a survey in Laguna Gómez Shallow Lake, during the pejerrey fishing season on June 5 and 6, 2016. Targets were anglers from 15 to over 70 years old who were fishing from the shore or boats. The survey collected information on the characteristics of the local anglers, the informal and voluntary conservation measures, and their prospects for recreational fishing in the future. Moreover, it identified the current concerns of the local anglers with respect to recreational fishing. A survey of users of the Patagonian inland waters was also conducted to make a comparative analysis of the characteristic of anglers and voluntary

conservation practices.

Data on the current situation of the inland recreational and artisanal commercial fisheries of both regions were collected from previous scientific literature and official documents, and through fieldworks. We interviewed anglers, local artisanal fishermen, owners of fishing establishments, academics, public officials, and representatives of non-government organizations so as to verify their perceptions and opinions about the inland fisheries management in Argentina.

Definitions

This section explains the main definitions used in this study. The term *institutions* refer to a set of rules that constrain human behavior in a certain situation [North, 1990:3-4; Ostrom, 1990:51]. It adopts the notions established by North in formal and informal constraints, and Ostrom on governing the common-pool resources (CPRs). Keeping in mind the definitions of the WCED (1987) and FAO (1989), *Sustainable Development* alludes to the use of resources over time through cooperation and coordination mechanisms. *Natural resource management* is defined in this study as the sustainable utilization of fisheries resources that generate goods and services to support human activities [World Bank, 2000:3]. *Inland fisheries* refer to “any activity conducted to extract fish and other aquatic organisms from inland waters [FAO, 1997:4].

The term *common-pool resources (CPRs)* indicates the resource systems, such as fishing grounds that are capable of producing a flow of stocks of resource units [Ostrom, 1990:30]. *Common-property resources* that have similar connotations are used depending on the context. *Anglers* refer to those individuals that use a line, rod, and hook for fishing, and *fishers* to those who use conventional fishing methods and non-conventional ones, such as gill nets and cast nets. Even though in Argentina the term *sport fishing* is frequently used, this study employed recreational fishing or angling, which includes sport fishing for competition. *Recreational fishing* is defined as fishing for leisure or pastime [Wegrzyn and Ortubay, 2009:301-302; Mancini and Grosman, 2008:30-31]. Co-management or *Collaboration management* refers to “regimes in which government and users have shared power and responsibility in enhancement or long-range stock recovery planning and habitat protection [Pinkerton, 1989:12]”. That is, the partnership arrangement between the governments and local stakeholders in fisheries decision making to conserve the resources over time.

Chapter structure of the thesis

The present study is divided into six chapters. Chapter 1, presents the theoretical framework of this study. It reviews the theory of transaction costs and institutions developed by Douglas North as well as the sociological approach to institutions. We believe that the characteristics of formal and informal constraints outlined by North and their effects on socio-economic development are relevant to our research. The views of Ostrom on institutions are also reviewed: she stated that institutions are a set of rules that limit human behavior in certain situations. It is argued that institutions are crucial to organizing activities within a community by giving some autonomy to local users to manage the resources. Chapter 2 examines Ostrom's theory of CPRs, contending that groups of individuals can develop rules to manage the resource system. In terms of fisheries, the evolution of fisheries management is presented, and the frame for comparative analysis of commercial and recreational fishing is outlined. Our hypothesis is that recreational fishing has the potential to reconcile exploitation and conservation of resources.

Chapter 3 outlines the fisheries situation and the institutional framework for fisheries management in Argentina. It also presents an overview of angling in the Patagonia region, describing the rules devised by member provinces and the process of building uniform and standardized inland recreational fishing regulations. We quote the framework of Ostrom in analyzing the use of CPRs, which reflects the collective action process in the Patagonian region. Then, regulations imposed in Buenos Aires have been examined, because member provinces of the Pampas region have not established a common fishing rule. The author intends to deduce how the Patagonia region has successfully implemented the inland fisheries regulations, whereas the Pampas region is still struggling to decentralize its fisheries management.

Chapter 4 and 5 are the main sections of our study. Both sections present the data collected onsite and examine the trends and issues related to recreational fishing management in Buenos Aires and Río Negro Province. They look over the fishing licenses issued to estimate the numbers of recreational fishers and the restocking programs held in both provinces, which we believe will affect the fish population. On the other hand, we review the inland artisanal commercial fishing practiced in two different communities located close to Pellegrini Lake, Río Negro Province and Las Tunas Shallow Lake complex of Buenos Aires Province. Although the first failed in sustaining cooperation among local fishers, the second has successfully achieved with self-organize and devise operating rules for over 30 years. Differences in local users' interactions were observed. Furthermore, surveys conducted with anglers at the Laguna Gómez Shallow Lake and those using Patagonian inland waters were analyzed to evaluate anglers' characteristics and voluntary habits in conserving resources. The survey found some similarities among anglers on conservation concerns as well as differences in preferences and socio-economic

conditions.

Collective action, cooperation, and collaboration management have functioned relatively well in the Patagonia region, and the consultation probably facilitated the use of common rules over time. Even though inland recreational fisheries management has been sustained in the region, certain shortcomings in the governance of inland artisanal commercial fisheries are found, such as rivalries among local users. In the Pampas region, particularly in the Buenos Aires Province, central authorities have managed inland recreational and commercial fisheries, and yet illegal practices persist. However, recreational anglers have adopted several types of informal voluntary conservation measures, and some artisanal commercial fishers have self-organized to sustain fishing activities.

This research concludes in Chapter 6, which argues the policy implications of inland fisheries management based on the results found in the four case studies. It is surmised that the consultation process can be a condition to create rules congruent to users' needs, which requires cooperation and coordination among stakeholders. It discusses the role of the government in sustaining the use of resources over time, using the argument of Ostrom in regards to the governance of CPRs. Finally, the author intends to answer the research question from an institutional perspective to manage the commons resources in the long term.

単行本もしくは雑誌掲載等の形で刊行される予定であるため、下記の部分を除外する。

具体的な箇所

箇所
Chapter 1 Theoretical Framework
Chapter 2 Common Property Resources and Fisheries Management
Chapter 3 Case Study: Argentina
Chapter 4 Inland Fisheries in Buenos Aires
Chapter 5 Inland Fisheries in Río Negro

Chapter 6 Conclusion

Institutional approach to govern the commons

Commercial and recreational fisheries involve both users and common-pool resources (CPRs). To conserve the fish population over time, management is crucial to constrain such use. In comparison with commercial fishing, recreational fishing has the potential to reconcile utilization and conservation of living aquatic resources. For this purpose, sustainable management can function effectively as long as there exist institutions consistent with local needs and environmental circumstances.

Theoretically, the term “institution” has several connotations. We have chosen the theoretical approaches of Douglas North and Elinor Ostrom to study the management of inland recreational fishing in Argentina. North defined institutions as rules of the game that shape human interactions in a society to reduce uncertainties, and they consist of formal rules, informal constraints, and their enforcement mechanisms. Ostrom, in turn, argued that formal laws can be converted into rules as long as individuals understand them and perceive that infraction entails sanction and punishment. Thus, she stated that groups of individuals sharing CPRs can create certain rules to build order and expectations in an action situation. That is, groups managing a resource system can self-organize to devise rules and enforcement mechanisms through communication and cooperation. However, she contended that rules can be sustained when the central government gives some autonomy to local groups to organize and make decisions on resource use, and it acts as a facilitator to arrange meetings or provide information to solve a problem in a local field setting.

Fisheries involve CPRs, so they face common physical dilemmas of subtractability and non-excludability. Hence, properly devised management regimes and conservation incentives are needed to prevent overuse of the resource system. Institutions for CPR management can be formal or informal. “Formal” institutions are regulations imposed by centralized government agencies, and “informal” institutions are constraints or customary habits usually based on procedures determined by individuals and local community groups. In recreational fishing, voluntary rules can also help to conserve the resources and anglers may contribute to conservation of fish resources through their involvement in the development of fishing regulations.

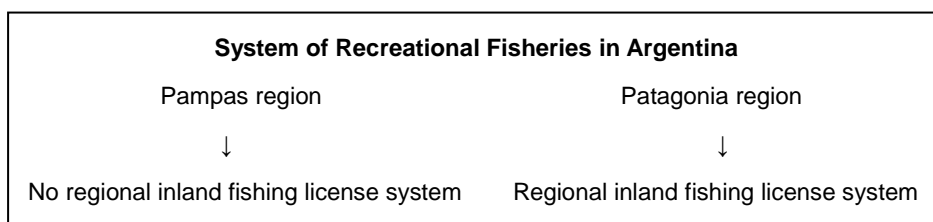
Management of recreational fisheries and the role of institutions

The management of recreational fisheries consists of the establishment of fishing regulations, restocking programs, and habitat manipulation. In Argentina, the dominant inland fisheries

management systems include regulations and restocking of native and exotic species. Provincial central governments manage and design both fishing regulations and restocking programs. However, member provinces of the Patagonia region and the National Parks Administration have managed to build a unified inland recreational fishing regulation that is mostly congruent with local needs. The initial involvement and advice of users may have been key factors that facilitated such achievement. Currently, technical advisors, academics, anglers, and private sectors are invited to participate in annual provincial consultation meetings to discuss issues concerning local fishing. In these meetings, information and suggestions are collected, and depending on their relevance, proposals are eventually presented to governmental authorities. The involvement and participation of users in developing rules and conservation programs can improve management goals, as shown by the case of Patagonia’s inland recreational fishing.

Conversely, the Pampas region has not been able to create unified recreational fishing regulations (**Figure 27**). This can be attributed to the lack of interest of the region’s member provinces in building standardized regulations. Administratively, the Buenos Aires Province, which covers almost the entire region, enforces its own fishing regulations. Moreover, Buenos Aires provides a wide choice of outdoor activities other than recreational fishing, and so the government may have disregarded the potential impact of fishing on the tourism industry and local economy [Grosman, 2001]. In contrast, the Patagonia region, located in the southern part of the country, is suitable for the habitat of salmonids and has been an ideal recreational fishing destination, thus becoming an important source of income for the region [Wegrzyn and Ortubay 2009:298]. The natural environment has enabled the restocking of exotic species to promote tourism at the local, regional, and international levels.

Figure 27. System of Recreational Fisheries



We observed that institutions developed through mutual agreement and cooperation have been internalized in Patagonia. Overall, the unified inland fishing rules have created order and expectations regarding the use of water resources in the long term. The rules that Ostrom identified can be applied to the case of Patagonia. The *position rules* authorize the member provinces of Chubut, Neuquén, Río Negro, Santa Cruz, and Tierra del Fuego, as well as the National Parks Administration as entities with the power to determine the restrictions, and the

boundary rules define how to enter or leave the position. Initially, Neuquén and the National Parks Administration developed the unified inland recreational fishing regulations, and then other provinces joined the inter-jurisdictional agreement. The *authority rules* determine the restrictions or actions that are permitted, required, or prohibited, such as the definition of fishing areas, angling methods, and gear types. The *aggregation rules* are defined annually through consultation about the changes in operational rules. The *scope rules* include the fishing procedures to be followed. The *information rules* refer to the provision of information such as regarding closed season, bag limits, and precautions. Finally, the *payoff rules* refer to payoffs assigned to anglers and other stakeholders as well as revenue obtained from license sales supposedly being used for the conservation of salmonid species. These clearly defined rules coupled with enforcement mechanisms can explain the sustainable development of inland recreational fisheries in the Patagonia region.

Ostrom's theory argues that groups of individuals can devise an efficient set of rules to organize repetitive interactions, which is supported by the case study of the Patagonia region. However, her statement that the centrally governed system can create local resistance does not apply to this region. The government's role in consolidating the inland recreational fishing regulations has been important, although the initial active participation and collaboration of direct users in defining the institutions may be the critical step in assuring congruence between the rules and stakeholders' interests. Moreover, each province has the task of monitoring and enforcing the regulations in accordance with its own internal rules. Free riders or illegal fishing has not disappeared, but it appears that fish rangers trained by provinces are struggling to control fishing sites in cooperation with local police and gendarmerie officials.

Even though the Pampas region has not consolidated their unified inland recreational fishing regulations, the Buenos Aires Province established an alliance with local angling clubs and associations. For instance, government farming entities provide eggs and alevins of native pejerrey free of charge to fishing clubs and associations owning pisciculture facilities, and restocking programs are conducted with the assistance of government officials. These angling clubs and associations are members of fishing federations. However, although issues concerning recreational fishing are discussed in their meetings, activities are rather limited to organizing fishing tournaments. Therefore, these informal groups have not participated in developing fishing rules in Buenos Aires. Their active involvement could contribute to the improvement of the conservation of fish resources.

Unlike the Patagonia provinces, there are many fishing clubs and associations in Buenos Aires. The population of Buenos Aires is much larger than the entire Patagonia region; its population including the metropolitan area is of 18.5 million, while the total population of the Patagonia region is 2.1 million [Instituto Geográfico Nacional, 2016]. Although the number of

fishing clubs and associations in Patagonia region is not significant, the region has been able to set agreed-upon rules, and inland recreational fishing has become one of the main drivers of its local economy. In Buenos Aires, the fisheries management regime has been centralized, and monitoring and enforcement systems have remained weak. The limited civil participation in decision making can be attributed to the government’s low interest in promoting this sector, given other investments opportunities.

In relation to the role of governments, local governments in the Patagonia region have crafted a unified and common inland recreational fisheries system that is mostly congruent with the social and environmental settings. In the Pampas region, the fact that Buenos Aires occupies almost the entire region and has a larger population than Patagonia may have led each province to devise and use its own internal fishing regulations.

Success and failure of inland fisheries

Inland recreational fisheries in Río Negro have functioned under the co-management regime, while fishing activities in Buenos Aires have been regulated by governmental legislation. The operation of inland artisanal commercial fishing in Río Negro has been managed and controlled under the umbrella of the central government. There is little participation of local users in the decision-making process. However, in Buenos Aires, groups of fishermen have developed their own rules through community-based organization while disregarding formal laws (see **Table 8**).

Table 8: Status of Fisheries by Region and Area

Region	Province	Type of fishing	Status	Variable
Patagonia	Río Negro: San Carlos de Bariloche area	Recreational	Sustainable	Collaborative management
	Río Negro: Pellegrini Lake	Commercial	Unsustainable	Centralized management
Pampas	Buenos Aires: Gómez Shallow Lake	Recreational	Recovering	Centralized management and favorable water conditions
	Buenos Aires: Las Tunas Shallow Lake	Commercial	Sustainable	Self-organized group

Inland fisheries in Río Negro Province

The case study of Río Negro in chapter 5 demonstrates that inland recreational fishing has been organized through cooperation and coordination between governmental and non-governmental organizations. Artisanal commercial fishers could not establish unified organizations (such as

cooperatives) to manage fishing. Although there was an initial attempt to operate cooperatively, fishermen have gradually taken an individualistic and competitive posture in terms of resource sharing, due to the disregard of users' needs by government agencies and local circumstances.

In this particular case of artisanal commercial fishing, as Ostrom pointed out, strong government intervention in resource management tends to affect the governance of CPRs. The government, by giving some rights to local users to organize their activities and acting as facilitators in problem solving can lead to sustainable use of resources. However, as Ostrom and her scholars' state, when the government controls the use of resources and sets rules that neglect local and environmental settings, the intervention can, at times, undermine local resource management.

The Honorary Directive Desk of Recreational Fisheries of Zona Andina, composed of governmental and non-governmental organizations, academics, and local tourism entities, has sustained its activities since 2001. Although the government has an important role as a member of this entity, it appears that its participation has been minimal, having delegated to other actors the rights to manage internal operations, particularly as regards control and inspection activities, and acting sometimes as a facilitator in problem solving. We argue that the Recreational Fisheries Desk could self-organize and manage inland recreational fishing over time through cooperation and coordination among member parties and the government. The *constitutional choice* action led to the organization of the *collective choice* action, and the latter determined the *operational rules*, a virtuous process in favor of sustainable fishing.

Conversely, the artisanal commercial fishing conducted in Pellegrini Lake presents a contrasting situation. The provincial government has the authority to issue fishing licenses to artisanal fishermen, and it controls and monitors the fish resources of the lake. Only six fishermen are entitled to use and commercialize the captures. Fish landing is controlled in a small filleting plant owned by a private owner. According to an agreement, local fishermen can use the facility to process their captures. The owner, in turn, sells their processed products to local markets and pays a determined fee to each fisher. However, conflicts arise with regards to payments, probably owing to the absence of a local agency to address the concerns of local fishermen as well as to the neglect of the central provincial government toward local fishing operations. Conflicts among fishers and uncontrolled use of resources persist. What is worse, fishers cannot act in a uniform manner due to internal distrust. All these factors can result in the overuse of resources. In the case of Pellegrini Lake, although the provincial central government has imposed rules, it appears that the monitoring and controlling systems are not operated properly. Decentralization can help to re-organize the inland fishing systems.

Inland fisheries in Buenos Aires Province

Inland fisheries have been basically managed by the provincial central government. The government has devised the institutions and allocated use rights of the inland CPRs. In contrast with Río Negro, because of the presence of large numbers of fishing clubs and associations, the province has several fishing federations. However, cooperative activities between these organizations and the government have been sporadic. Fishing federations have been mainly engaged in organizing recreational fishing tournaments, with no participation in decision making about fisheries. In terms of inland artisanal commercial fishing, although licenses were provided to local fishermen decades ago on a cooperative basis, commercial capture was forbidden in all shallow lakes of Buenos Aires Province until 2016.

Inland recreational fishing is regulated under the stipulations specified in the “Reglamento de Pesca Deportiva” (Recreational Fisheries Regulations) issued by the government of Buenos Aires. However, little is known about the regulations and, both control and monitoring have been perceived as inefficient. The survey conducted in Laguna Gómez Shallow Lake, Junín, revealed that of the 82 surveyed anglers, only 21% responded that held a proper license. Presumably, there was no license control or monitoring of captures. Moreover, although 73% of the total respondents agree with the stipulations imposed by the government, some ignore the regulations about exceeding capture limits. However, in terms of resource conservation, most anglers (67%) adopt certain voluntary preservation measures indicating that they are not unconcerned about resource conservation. Therefore, the situation in Junín is characterized by the presence of voluntary informal institutions in recreational fishing activities.

The informal rules or habits include the release of small and uninjured pieces of pejerrey species back to the water, participation in keeping the fishing site clean and taking home the garbage, and transmitting the implications of conservation to the next generation. Certain areas of Laguna Gómez Shallow Lake have been polluted, but this may be attributed to the lack of garbage containers at sites where anglers concentrate. We also observed that small pieces of pejerrey species were discarded on the ground. Hence, there is still a need to formulate policies to educate anglers about the sustainable use of resources and improve the conservation efforts.

The problem of subtractability and non-excludability exists in the shallow lakes of Buenos Aires. In Laguna Gómez Shallow Lake, even though most anglers release the captured fish units, some overfish the pejerrey resources. However, fishing activities are recovering due to favorable water conditions, interest in developing activities at the shallow lakes, and good availability of seeds and juveniles for restocking programs.

Furtive fishing predominates in Buenos Aires, which has been one of the most relevant concerns for the government and fishers. Control and monitoring have been difficult due to several reasons, including lack of personnel, vast area of the region, and large number of water

bodies. Artisanal commercial fisheries in shallow lakes of Buenos Aires were held under the control of the government [Alvarez and Zingoni, 2001:148]; particularly Las Tunas Shallow Lake was one water body that produced pejerrey species for human consumption. Even though fish landings were prohibited until 2016, fishermen of Beruti Village continued exploiting the fishing ground. They became self-organized and devised the fishing operational (time, space, and technology) and monitoring rules over the past 30 years. These informal groups have also created a chain to trade the captures through coordination and cooperation. In 2015, 40 families were engaged in pejerrey fishing, and processing techniques have been transmitted through generations. Fishermen using the resource system have revealed that landings were sustainable over the years, suggesting that even without the intervention of the government, they successfully managed the CPRs. Las Tunas complex has been occupied solely by this closed community that restricts access to outsiders and respects the closing season rules. In 2016, after more than a decade, the government has authorized the practice of artisanal commercial fishing in Las Tunas complex. This history implies that a community locally devising and managing institutions can use an enduring resource system.

Factors affecting management of inland fisheries from an institutional perspective

We have argued that inland commercial and recreational fisheries management systems have had differing results from an institutional point of view and that within the same province two fishing regimes exist, the central and co-management patterns. Collective action and cooperation have prevailed in the Patagonia region and Río Negro Province. However, these components have led to the organization of only recreational fishing activities. This may be because recreational fishing became a key driver for local economic development, and conservation of fish fauna was a priority. Regional governments have gathered and integrated local stakeholders for the consultation process to develop the inland recreational fishing rules. The consultation process and participation of local users in the discussions may have helped create this enduring fishing regulation system in Patagonia. Holding a proper license has been internalized as a habit by most inland water anglers. Several conditions explain this achievement. For instance, in Bariloche city, permits are accessible to the public, some of which can be obtained at local fishing gear and tackle stores or gas stations; most fishing guides are licensed professionals; shared patrolling services exist; and local stakeholders promote programs for resource conservation.

Co-management is practiced in some regions. A clear example is the stakeholders' partnership represented by the Honorary Directive Desk of Recreational Fisheries (*Zona Andina*) in Río Negro that has crafted internal rules to conduct recreational fishing activities over the years. Although the coordinator in charge of managing the organization is a central government envoy,

the entity has certain autonomy to organize its activities collaboratively. For instance, members have agreed to build a mechanism to expand the education about conservation of fish resources and distribution of recreational fishing licenses in elementary schools of remote rural areas in Bariloche Department, although budgetary constraints and the need to train central officials in fishing activities remain to be addressed.

The top-down approach prevails in Buenos Aires, where monitoring and enforcement remain weak. In terms of fishing regulations, most local anglers do not hold a proper license as demonstrated by the survey held in Laguna Gómez Shallow Lake. Furthermore, collective action and cooperation among users or stakeholders have been minimal. Collaboration between the public and private sectors exist in fishing tournaments activities; the government monitors and controls catches and promotes events, while the private sector such as angling entities arranges the competitions. However, local users do not participate in developing fishing regulations. Moreover, it seems that the province is not yet prepared to manage recreational fisheries since licenses are not accessible at the local level, and training courses for fishing guides are not provided in the province. The existence of large number of users with differing interests may have impeded the collaboration, which is in contrast with the case of Patagonia.

With respect to restocking programs, even though the management has taken place under government supervision, its performance differs between the two regions. The data presented in chapters 4 and 5 indicate that while production and distribution of pejerrey resources for restocking increased in Buenos Aires, releasing programs decreased in Patagonia. It seems that the government of Buenos Aires has worked actively to promote pejerrey culture by acquiring technologies from Japan. In Patagonia, experts from Japan have shared salmonid farming techniques, but restocking activities may not have been as active as in Buenos Aires. The difference could be attributed to two environmental factors. First, in Buenos Aires, the cultured and restocked species is a native one, while Patagonia has historically introduced exotic species, which is considered a threat to the natural habitat. Second, the shallow lakes of Buenos Aires are vulnerable to climate changes, such as floods and draughts, which often make it necessary to restore the water environment. In Patagonia, the glacier lakes, rivers, and streams shared with neighboring provinces make the exotic species flow into other jurisdictional areas, which can perturb the local aquatic ecosystem.

Inland artisanal commercial fisheries in both regions present a peculiar situation. In Lake Pellegrini (Río Negro), although catches are operated by authorized fishermen (six in total) and landings are officially controlled, it was noted that the local fishing community has the stance of competition and rivalry, and hence cooperation does not exist. The difficulty of profit sharing may be the factor generating internal conflicts, which induces clandestine fishing. Moreover, not only low control but also inconsistent restrictions facilitate such behavior. Central provincial

governments should reformulate the management regime and open a space at the community level to improve the situation.

The situation of inland commercial fishing in Las Tunas complex was the opposite. Local fishers, at the time of the interview (2015), were harvesting pejerrey units without authorization. These fishermen who were former agricultural farmers that had to change their usual work for their livelihood, have self-organized and created their own rules to use the resource system of Las Tunas Shallow Lake. The absence of governmental intervention on resource use may have led to the creation of an internal rule to sustain fishing activity within the community.

Recent actions taken by the new provincial government in Buenos Aires can be considered logical in this regard. In 2016, the new administration, jointly with the local government, authorized the harvest of pejerrey species in Las Tunas Shallow Lake to legitimize the position of fishermen and help them sustain their living. However, central and local authorities state that cooperation and communication between the parties are crucial to achieve sustainable development of inland fisheries in the region. Moreover, since monitoring and enforcement are important factors for governing CPRs, the government has announced its commitment to reinforce the system. The central authority of Río Negro Province should also convert the clandestine fishing practices into legal activities to meet the needs of local resource users.

In terms of the level of compliance with centrally governed regulations, even though local commercial fishers in Lake Pellegrini are authorized users and report their volume of landings, there is no cooperation among them and competition about the number of captures predominates. It seems that unequal returns hinder local fishing organizations. On the other hand, unauthorized users in Las Tunas Shallow Lake have been harvesting pejerrey over the years. There was no compliance with official regulations but a group of local fishers have settled on their own catching rules and coordinated their activities. The clearly defined income shares and social organization may have enabled the sustainable development of inland pejerrey fishing in this region.

Empirical research findings and their political implications

The purpose of this research is to determine how management and conservation of inland fisheries can be sustained in Argentina over time, adopting an institutional approach on the governance of resource systems. The government's role is crucial in organizing the use of water resources, but the involvement and participation of all concerned groups in decision making is also important to conserve the resources in the long term.

Cooperation between stakeholders can help create fisheries regulations that are mostly concordant to users' needs. Provincial member governments and the National Parks Administration have devised institutions governing inland recreational fisheries of the Patagonia region. However, prior to the establishment of fishing operational rules, consultation meetings have been held in some provinces, in which local recreational fishing stakeholders participated in discussions. In general, inland recreational fisheries are well organized in the sense that holding a proper license has become internalized for most anglers. On the other hand, groups of individuals can self-organize and devise their own rules as long as local rights are recognized to conserve the resources, such as the control and inspection activities held by the Honorary Directive Desk of Recreational Fisheries in the Río Negro Province. When the government intervenes as the ultimate authority to manage resources and impose rules without consultation, conflicts over the use of resources and clandestine catches and smuggling can emerge, as in the case of artisanal commercial fishing in Lake Pellegrini.

The fisheries case studies of Buenos Aires have demonstrated that even though governmental fishing regulations are in force, they can, at times, be disregarded by users due to weak control, monitoring, and enforcement systems. One consequence of this is furtive fishing and overuse of resources in some places. However, both inland artisanal commercial and recreational fishing have self-managed the fisheries without strong intervention from the government. Sustainable development of fisheries can be achieved through collaborative management by incorporating locally devised institutions. As Ostrom pointed out, the government can act as a facilitator in providing basic equipment and information and arbitrating internal agreements.

The survey also revealed that local anglers, who are mostly working class with basic formal education, are likely to engage in conservation programs. Recreational fishing is not only an important social activity but also a source of food. Despite their low income, the surveyed anglers showed their willingness to pay a minimum fee to improve the fish stock and quality of fishing activities. Moreover, this segment of the population adopts certain voluntary conservation measures of pejerrey resources. Recreational fishing is not only a traditional leisure activity for middle-class or wealthy population but also a valuable recreational activity for the low-income population having a sense of environmental ethics or long-term rationality.

According to the survey conducted with anglers at Laguna Gómez Shallow Lake and Patagonian inland waters, both adopt voluntary conservation measures such as the catch-and-release method. In terms of occupation and formal education, anglers fishing in Patagonia's inland waters are better positioned than those fishing in the inland waters of Buenos Aires. Additionally, all of them hold proper fishing licenses, but none consumes the captured species. Furthermore, they showed willingness to pay a fee to improve the quantity of salmonid and the overall quality

of fishing activities in the region. It seems that resource conservation concerns are similar for anglers of both the Patagonian and Pampas regions.

These empirical findings have political implications. From an institutional perspective, the centralized management approach as observed in Buenos Aires could probably be enhanced by changing or expanding the recreational fishing license system, especially as most anglers may not know of the existence of the system. Moreover, although capture sizes and quantities are established voluntarily, there is a need to develop a system to collect information on recreational fishing and build a development program to improve the current uncontrolled situation.

The case of Patagonia showed that collective action and cooperation can generate effective results in terms of devising fishing regulations. In Buenos Aires, cooperation between governmental agencies and communities at the local level as well as inclusion of local stakeholders on consultations could be a way to enhance fishing activities. The consultation process used to organize inland fisheries of Patagonia indicates that the initial phase is critical to develop a long-enduring institution. The institutional approach utilized to examine the fishing activities in Argentina can be applied not only in the area of fisheries but also to other development and resource management fields.

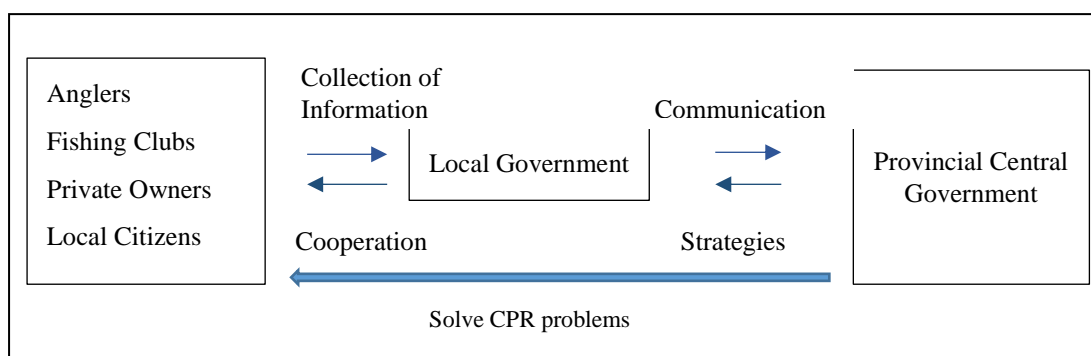
On the other hand, both regions can complement each other in innovating management approaches. An example could be the democratization of fisheries management in Lake Pellegrini, similar to what happened in Las Tunas Shallow Lake, with the advent of the new government administration. In turn, cooperation between local governments and angling organizations (similar to the case in the Patagonia region) can create a collaborative mechanism for the fishing licensing system, for instance, by distributing licenses to fishing clubs or associations and using the collected funds to develop statistical data or formulate pilot projects.

Formulation of strategies intended to respond to local anglers' needs such as improving the fishing facilities and quantity of fish stocks are necessary to sustain the activities. Moreover, since inland recreational fishing in Buenos Aires contributes to food security, limnological and ichthyological controls must be reinforced in collaboration with local and provincial governmental agencies.

Local governmental offices such as municipalities can play a crucial role in collecting information about the resource system; conditions of the control and monitoring operations; and suggestions from fishers, fishing clubs or associations, private owners of fishing grounds, and local citizens. The information collected from direct and indirect users can be processed, analyzed, and evaluated at the local level and their concerns about the resource system communicated to the provincial central government. In order to respond to these concerns, the central authority, in coordination with the local government, can formulate strategies to address users' needs and improve fishing conditions at the local level. In this way, a cooperative mechanism can be

established locally to solve conflicts or CPR problems (**Figure 28**). Decentralization and participation of users in resource management can contribute to conservation efforts. Since budgetary constraints are the most common factors that undermine project initiatives, alternatives such as the use of existing tourism or fisheries production offices within local government establishments can be of much help.

Figure 28. Process to Solve CPR Problems



Institutions and sustainable development: A human security approach

As explained in the introduction, the concept of human security began to pervade internationally with the advent of new security threats affecting the core lives of human beings. Thus, the United Nations Development Programme (UNDP) report underscored the need to tackle challenges of human security, including threats to hunger, health, and deterioration of local ecosystems.

The growing demand for natural resources, including fisheries and its overexploitation, generate new challenges to human security. Development and exploitation of resources while neglecting environmental considerations leads to menace people’s livelihoods in the long run. The introduction of exotic Nile perch species into Lake Victoria is a known case of failure. Thus, creation of an adequate institutional structure is crucial to promote sustainable development. The management and conservation of natural resources consistent with local settings can mitigate the negative impacts on human security. Inland fisheries institutions can function effectively as long as cooperation and coordination prevail among stakeholders. Participation of direct users and local actors in decision making can improve social and conservation outcomes. Centralized institutions that neglect social and environmental needs are likely to fail, as has happened in the case of artisanal commercial fishing in the country.

Postscript: Toward a comparison with the case of Japan

The role of fisheries and aquaculture in global food security and socio economic development has been recognized in many parts of the world. Prior to this research, the author examined aquaculture development and its implications in Latin American countries, exploring the successful case study of the Chilean salmon industry. In view of the fact that aquaculture programs have not prospered as expected in countries such as Argentina, the present research focused on the study of inland recreational and artisanal fisheries. This is because fish farming programs have contributed to the development of both types of fishing activities in that country.

To study the governance of inland fisheries in Argentina, an institutional approach was adopted using the theoretical framework of North and Ostrom for this research. Its aim was to examine how resource management and conservation can be sustained over time. Institutions are important elements to constrain the use of water resources and prevent overexploitation. However, the imposition of formal rules that are not congruent with users' needs can, at times, hinder the local organization and degrade the resource system. In turn, when some rights are given to local stakeholders to organize the CPRs, institutions can endure over time. The case of Argentina showed that although the resource management system in some regions presented failures from an institutional perspective, other regions could devise sustainable fishing rules through cooperation and coordination among local stakeholders.

Management and conservation of inland recreational fishing systems vary across the countries, and institutions cannot be transferred easily. Nonetheless, study of the fisheries management system in Japan could help better organize the recreational fisheries in Argentina. Outlining some aspects of recreational fishing in Japan, this activity has been mainly managed by local Fishing Cooperative Associations (FCAs), whose member organizations are local fishers that rely on fisheries and belong to regional fisheries federations. There are two types of associations: "inshore local fishery cooperative associations" that operate in ocean areas and "inland water fishermen's cooperative associations" that use the resources from rivers and lakes [Hokimoto, 2009]. Fisheries in Japan are performed under a co-management regime. The government gives rights and licenses to local fishermen and FCAs. Such organizations that represent the fishermen manage the fisheries and establish rules and enforcement mechanisms on an autonomous basis [Matsuda *et al.*, 2010:899], despite the existence of a prefectural fishing regulatory framework [Makino and Matsuda, 2005:445]. The government, in turn, supports their activities by providing legal and scientific information and financial assistance, thus lowering transactions costs [Makino and Matsuda, 2005:447-448].

Ruddle and Segi state that although inland recreational fishing is managed by local FCAs, marine recreational fishing is usually not properly managed, leading to conflicts and unsustainable use of resources [Ruddle and Segi, 2006]. Therefore, inland recreational fishing tends to be better organized in terms of conservation. Moreover, restocking programs are managed by fishing cooperatives that establish the time and areas of restocking. Alevins are bought from other facilities and reared on site, so that juveniles can be released into the water bodies, as was observed in Okutama Fishing Center in Tokyo, Japan. In the case of Kawaguchiko, its FCA organizes releasing programs of several species into the lake to foster recreational fishing [Kawaguchiko Fishery Cooperative Association, 2015]. Since the stock of fish fauna can contribute to the biodiversity of the aquatic environment as well as to recreational and artisanal fishing, the author intends to conduct further research in Japan so as to formulate programs that could promote fishing activities in the context of the Latin American region.

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